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THE EVOLUTION OF THE LITTLE RED SCHOOL-HOUSE.

THE little red schoolhouse of primitive type still exists in some rural districts of the early settled states; but only a few remain, and those are fast passing. However, one who is curious to do so may turn aside from the railroad and trolley lines and betake himself to regions remote, and there find the youthful portion of the population still sitting upon old plank seats of colonial pattern and bending over uncomfortable benches, deep-cut by the jack-knives of several generations.

At first sight such buildings seem to have little in common with the beautiful and convenient modern structures which are the pride of many towns, but one may follow along the country road where still sits the old schoolhouse, "a ragged beggar sunning," make his way to larger villages and thence to cities, and find along the way all the successive stages in the evolution of schoolhouse architecture.

Time has a way of writing its story in hieroglyphs, which appear only as chance markings to one who does not know the language, but become full of interest when he learns to decipher the record. A branch from a tree in winter may apparently be only a gnarled stick, but each wrinkle and scar is there because of some vicissitude in the life of the tree. In its struggle to realize itself we find the record of last year's growth and that of the year before, where the leaves grew and how many there were, something of the character of past seasons and many suggestions

of future growth. The various forms of school buildings which one sees in his journey from village to city are not arbitrary designs. If the spectator is at all familiar with the history of education, he reads its record plainly in the changes of exterior and interior, and can trace direct lineal ascent from the weather-beaten district schoolhouse to the modern temple of learning. Varying ideas of child life, of what constitutes education, of the relation of education to the community, have changed the location and shape and furnishings of school buildings. There are portrayed the decadence of the old colonial pride in a dignified management of schools, the struggle between the town and district systems; the history of the long conflict that led to the triumph and acceptance of the principle that "all the property of the town is liable for the education of all the children of the town;" the renaissance of public education with its demand for good buildings and equipment and well-trained teachers, its higher ideal of discipline and its encouraging promises for the future. The architecture and equipment grow very confidential with the records and secrets they hold.

The necessity of education was felt by the early settlers, but the idea of free public education was not familiar to them. The expenses of school were borne by those who had children to send. The early meeting-house was often built by the whole community, while accommodations for the school of that time were as often provided by a small portion of the population. Under these circumstances it is no wonder that schools were inadequately housed and furnished. Parts of houses were rented, and even barns were used. The first laws required education, but not schools. Later laws required public opportunity for education and therefore schools.

In New England in the latter part of the eighteenth century came a distinct advance in broad educational views when a fee was charged for all children of school age, whether in attendance or not. Various rates were levied, somewhat as follows; male children from six to twelve years, 10 shillings if in attendance, 5 shillings if not in attendance. The following extracts from a New England town report are indicative of this progress:

December 7, 1719: Voted that we will hier a school master if we can hier one in town for this winter till the last of March insuing the Date here of upon the following conditions, viz., Wrighters to pay four pence a week and Reeders three pence a week and the Rest to be paid by the town.

November, 1724: Boys from six to twelve years of age shall pay the school master whether they go to school or not, four pence a week for Wrighters and three pence a week for Reeders.

Then came the appointment of a special committee to have educational matters in charge, and we read under date of November 2, 1737, of a committee appointed to hire a schoolmaster "as cheap as they can and as speedy as they can."

Soon arose the great question of general taxation for free public schools. This was opposed by many who had no children, but prevailed, and made possible the beginnings of school architecture as such. Children were now to have a schoolhouse. Its cost and design and furnishings were sadly limited by scant means, and no less by narrow ideas of child life and education; but it was a beginning. There were to be buildings now, the main purpose of which was educational.

In many sections, under this system, the district, and not the

town, became the unit of school management, but general taxation, where it became the custom, brought about an advance toward complete unification and wider interest. With what poverty the schools of this period were compelled to struggle may be gleaned from reports of early New England town meetings. For example:

1786: Voted not to have schooling this winter.

1787: Voted to raise the sum of £10 and divide it among the five school districts, each district to receive 40s.

1789: No money appropriated for schools on account of building the meeting house.

1790: The building erected on the hill for a pest house was removed into the town street for a school house.

The New England country school buildings during these days were of the plainest style, unadorned structures, with only the necessary elements of architecture, and were usually painted red. One entered the small, one-room buildings by an entry way in which wood was piled. Here hats and coats were hung upon pegs and nails, and dinner-pails were placed near the wall. Heating, ventilating, and sanitary arrangements were of the crudest sort. Sometimes wood in all lengths and shapes was dumped in the school yard to be worked into usable form by the big boys at recess. In more well-to-do communities it was brought ready for use. Sometimes wood was furnished by the parents, and the sentiment of the community was that if any neglected to send wood their children should have no benefit of the fire.

After the time of fireplaces a large square stove usually stood in the center of the room. From this a long pipe, suspended by chains, reached to the end of the building, where the chimney stood. As fires were usually built shortly before time for the session, the room on cold days was seldom thoroughly warmed during the first half of the forenoon. The glowing stove heated whatever surface was toward it. The children in the nearest seats vainly tried to shield themselves from the fierce heat, while those farthest away shivered with cold. A teacher in a building of this type told me that on one day the thermometer stood at twelve degrees above zero when school opened,

and added that consequently the children farthest from the stove found difficulty in writing well. To dismiss the pupils on account of the temperature would have been thought effeminate. All ventilation was obtained from windows and doors.

Seats were constructed with small consideration for comfort. The most primitive were planks set on legs. These were sometimes taken out at noon time, turned bottom upward, and used

for sliding down hill when the snow crust was strong enough. Other seats were made of planks with an upright support at either end. Where these seats without backs were used, the benches were generally placed against three walls of the room, and pupils set in a hollow square facing the walls and with backs to the stove and the teacher. I once saw a class in such a school called upon to recite. The children swung their feet over the seat and came around the other side to, quite skilfully.

Later, benches were built with vertical backs and seats at right angles with the backs. One fails to conceive why it should not have occurred to the builders to modify the vertical and horizontal angles of these benches sooner than they did. Such

seats were exceedingly uncomfortable. For the sake of experimenting with the experiences of past generations I have sat in them for a while and contemplated the hours kept by some of those early schools. In one large town they were as follows: "Nine hours a day in summer and less in winter"—how much less the record does not say—"and six days a week." The shape of the long benches offered some compensating possibilities. I have seen a small boy lean first on one arm, then on the other, try all imaginable positions for comfort, and finally stretch himself lengthwise along the seat and go to sleep. His sum total of comfort during the session seemed equal to that of more favored pupils in modern adjustable seats.

The movement to substitute the town system of school management for the district system began to obtain widely somewhat later than the middle of the nineteenth century, and this marked a new era in school architecture. Wherever the district system was abolished, the whole town took an interest in each schoolhouse. Every district demanded for itself as good as the town afforded.

With the growth of population, schoolhouses became larger, and some architectural decoration began to appear. Belfries and porches were built on many. Red gave way to white and yellow and brown for outside color. On one schoolhouse a curious example of ornament appeared in the shape of a painted dial with the hands at nine. This was called the nine o'clock schoolhouse. One likes to imagine just what was the psychological effect upon the pupils of such an adornment, whether it emphasized the importance of the dread hour of opening, or had the opposite effect.

The interior decoration of early schoolhouses was meager indeed. The walls were bare, usually white till time kindly grayed them, and uninteresting till cracks spread waywardly through the plastering and furnished suggestions to the imaginative boy who traced figures of men and animals and trees among them as one traces constellations among the stars. Many a piece of stained and cracked plastering has become a scene full of interest to the occupants of the nearest bench. Perhaps this

stimulus to the creative imagination was not without its educational value. It certainly was better than the custom which prevailed to some extent a little later, of having as the most prominent adornment of the room physiological charts showing the internal effects of different stages of inebriacy. Maps and a few cheap prints and gaudy chromos usually completed the would-be artistic decoration of the room.

The little district schoolhouse, even with its extreme plainness of outline, was yet small enough to nestle among trees or take its place in the landscape without being wholly unpleasant, but when more ample accommodations were required and larger buildings were constructed on the same plan, the results were unsightly and repellent. The buildings were too big to be hidden. Their proportions, without rhythm or design, produced effects of extreme ugliness.

That such surroundings made an appreciable difference in the quality of the education received was not generally understood. Bare, white, or soiled wall spaces, monotony of right angles in ugly proportions, second-rate pictures in poor frames hung at

various angles, dirty and littered floors, are something more than matters of taste. They enter into the nature of the child who has to be with them, and modify his standards and habits.

A good teacher of fine personality can transform the barest schoolroom and counteract its influence by his own. At least he can see that it is neat and that there is some inspiring decoration to relieve empty spaces.

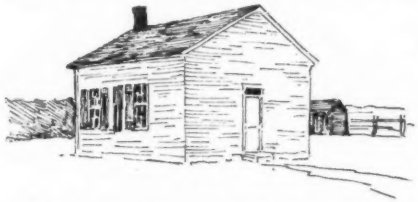
The first American teachers were men of character and learning, and schools were in good repute. Gradually other employments became more inviting and profitable. At the close of the Revolutionary War many wandering adventurers without character offered themselves as candidates and were accepted. Such men lowered the level of estimation with which teaching was regarded.

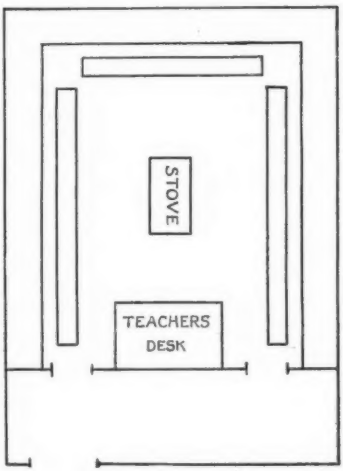
The effect of the district system was not favorable to an increase of efficient teachers, because the local committeeman usually appointed his nearest of kin to the position. Blood-relationship to him was the surest passport to a situation as teacher in his district. In this way schools fell into the hands of teachers without training or fitness. Teaching was not regarded as an art, and no special preparation for it was considered necessary. Lessons were in the book, and it was the business of children to learn them from that source and recite them to the teacher. The popular opinion regarding teaching was expressed by a man who said to his daughter on her return from school: "I don't see why you should be tired. You have nothing to do all day long but to sit and hear lessons."

To reveal the world to children, to enrich their lives with increase of power and appreciation, had not become, in general, the work of the school. The attitude even of some teachers toward any study not connected with books found voice in the statement of a teacher who said: "I have no time for nature study. The regular program of things the children really need takes about all the day, and the only opportunity for changing the regular program is on Friday afternoon, and then we have exercises in mental development." So low at one time did the general interest in public schools fall that we find such records

as this: "Voted that the town instruct the school committee to discontinue their visits of school inspection."

This attitude had a lamentable effect upon the buildings and their furnishings. Nearly all records of the middle of the nineteenth century report the condition of schoolhouses as disgraceful. The chief recommendation for a location was that it should be worthless for any other purpose, and for a building that it should be cheap. Health, comfort, and the inspiration of beautiful surroundings seemed to count for almost nothing. One is not surprised to find as a fit accompaniment of these conditions that the highest popular recommendation for a teacher was that he or she could keep order.





Slowly, however, protests gathered strength and made themselves felt from physicians and parents who realized the value of health; from citizens and educators who appreciated the great opportunity open to public schools, and the fact that education is the bulwark of states; from clear-sighted thinkers, who knew that the schoolroom should be a place for the fullest development of child life as such, and not its complete repression. These demanded better ventilation and more comfortable and healthful surroundings, shorter hours, teachers who were trained to understand the scope and nature of their work, and an environment which possessed a large degree of refinement.

The architecture and setting of public buildings devoted to a

special purpose offer a tolerably full and correct revelation of the attitude of the public toward that purpose.

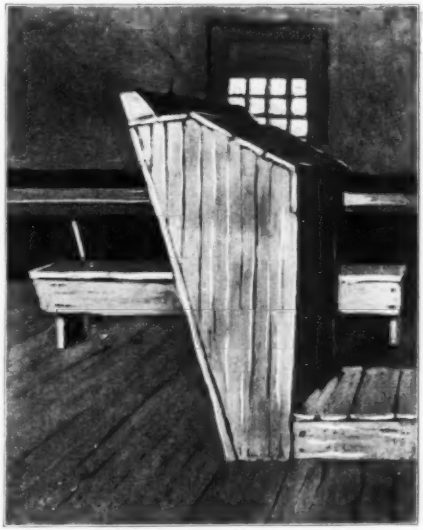
During this dark period came hints of an arousal of public interest prophetic of the present-day movement. Educators all over the country realized the fact that scarcely less important than the character of instruction are the physical conditions under which it is given. The aroused realization of these elements as necessities of good education, and the resulting demands, have made themselves felt in recent times. It is only within about fifteen years that best results have been seen. During that time, however, great advance has been made. The steps of the renaissance are so recent that all stages may be seen in buildings still in use.

Few changes in school equipment have been more important than those in heating and ventilation. It seems inconceivable that for many years so little attention was paid to the bad effects of the heavy, lifeless, overbreathed air of an unventilated schoolroom. Even now one finds it occasionally and is moved to make protest, even if he be a stranger.

In this matter of heating and ventilation the advance has been along lines similar to the following. After the time of fireplaces came the stove with its direct heat, and all the fresh air that entered came by way of doors and windows. If there was air to breathe, its quality was seldom questioned; so in winter windows were not often opened. Later the stove was sometimes surrounded with a shield of sheet metal, which allowed passage for hot air and cut off direct radiation. This arrangement added materially to comfort. In response to the growing demand for ventilation, windows were fitted with boards or air boxes to allow access of fresh air and yet protect children from direct draft. In larger buildings, furnaces furnished a substitute for stoves.

Most of these systems of direct heating had the sad defect

of re-warming the air already in the room. In winter all fresh air was necessarily cold. Systems of indirect heating were the next and most valuable step. By these, a volume of fresh air is continually poured into the room, whether the temperature needs changing or not. This air on its way can be sent through heating apparatus and thus enters the room at any desired temperature. This arrangement is supplemented by apparatus for the removal of foul air. The following quotation of the requirements of the department of inspection of public buildings in Massachusetts regarding school buildings illustrates a safe standard:



In the ventilation of school buildings the many hundred examinations made by the inspectors of this department have shown that the following requirements can be easily complied with:

1. That the apparatus will, with proper management, heat all the rooms, including the corridors, to 70° F. in any weather.

2. That, with the rooms at 70° and a difference of not less than 40° between the temperature of the outside air and that of the air entering the room at the warm-air inlet, the apparatus will supply at least thirty cubic feet of air per minute for each scholar accommodated in the rooms.

3. That such supply of air will so circulate in the rooms that no uncomfortable draught will be felt, and the difference in temperature between any two points on the breathing plane in the occupied portion of the room will not exceed 3°.

4. That vitiated air in amount equal to the supply from the inlets will be removed through the ventiducts.

5. That the sanitary appliances will be so ventilated that no odors therefrom will be perceived in any portion of the building.

To secure the approval of this department of plans showing methods or systems of heating and ventilation, the above requirements must be guaranteed in the specifications accompanying the plans.

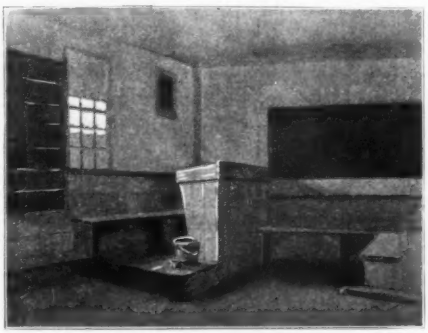
When one realizes how vital is the relation of fresh air to health, he looks upon such requirements as an example of civilized progress. Yet it is strange to observe how at first a demand for such ventilating apparatus was considered eccentric. The apathy on the part of intelligent communities toward extremely unhealthy conditions in the schoolroom was one of the surprising obstacles encountered in the early days of this reform.

The change from old benches to modern seats has been gradual. Chairs and desks are now designed on lines suggested by people who have made a specialty of school hygiene, and results are increasingly gratifying.

In recent buildings the manner of lighting has received much attention. One seldom finds schools today where pupils are compelled to face the glare of light from windows directly in front, though such a condition was common enough twenty years ago. The primary function of a schoolroom window is to admit light, but the secondary one of affording a restful outlook is by no means unimportant. Varying opinions regarding the latter

function are interesting to note. In Germany windows were often set high to prevent pupils from looking out, while in some Swiss cantons any conditions which prevented free outlook were regarded as objectionable. Recent rules for Berlin schools permit low window sills.

In later years the problem of the color and decoration of schoolroom walls has assumed prominence. It is a question of much practical importance to school work. Some unrestful colors are an element in hindering effective study on the part of children, when a trained adult might find such influence unimportant. Children have not the degree of ability for voluntary attention that belongs to a mature age. The psychological effect of wall colors is too complex a subject to discuss here. Experiments, however, have brought forward the following practical suggestions:



Glaring white walls are distracting and harmful. An intense tone of any color is almost certain to be unsuitable for a wall space, and also is too assertive to take an appropriate place as background for pictures and other decorations. Blues are likely to be cold and repellent. Reds, so delightful in a dining room

or library, do not seem to be stimulating to intellectual effort. The right tones of yellowish and greenish hues, through the range of ivory and the terra-cottas and olives, are usually considered as best adapted to schoolrooms.

The last few years have brought an abundant supply of good reproductions of works of art, and pictures of all lands and their people and architecture. These are rapidly taking the place of worthless prints, and their price places them easily within reach of the poorest schools.

Public opinion regarding the location of schoolhouses has kept pace with the improvement in architecture. A pleasant, healthful location has always been recommended by educators, and such recommendation often utterly disregarded by those with authority to choose the site. Lowell's mention of the schoolhouse built on a marsh is a reminder of conditions not at all uncommon in the past:

> Propped on the marsh, a dwelling now I see,
> The humble schoolhouse of my A. B. C.,
> Where well drilled urchins, each behind his tire,
> Waited in ranks the wished command to fire.
> Then all together as the signal came
> Discharged their A. B. Abs against the dame,
> Who, midst the volleyed learning, firm and calm,
> Balanced her furloughed ferule on her palm
> And to our wonder, could divine at once,
> Who flashed the pan and who was downright dunce.

As early as 1841 Henry Ruffner, president of Washington College, in a plan presented to the legislature for the organization and support of common schools in Virginia, gives the following far-sighted and valuable suggestions:

Schoolhouses should be so placed as to unite in the highest possible degree the twofold convenience of centrality and pleasantness of situation.

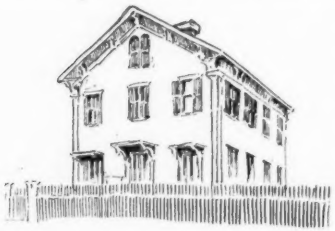
In extensive districts schoolhouses must of necessity be near the middle point that all may reach it without too much difficulty; and pleasantness of

situation must sometimes be sacrificed in part to this necessity. But in smaller districts some greater or less removal from the center should be allowed for the sake of a dry, healthy, agreeable spot, near good water and remote from bad moral influences. The difference between the best and worst situation for a schoolhouse should have some influence in laying off the boundaries of districts. A sufficiency of ground should be attached to the rural schoolhouses, and, if possible, those in towns also, to furnish playgrounds and other appurtenances, either useful or ornamental. The children should not be necessitated to trespass on private property or to go into the streets for exercise and amusement.

In the construction of schoolhouses commodiousness is the first requisite; that is, space sufficient for all without crowding or confusion, and for a large school two apartments; a comfortable degree of closeness and warmth in winter, healthful ventilation at all times, glazed windows properly distributed,

well made and properly arranged furniture, and a scrupulous cleanliness within and about the house.

But not only should the schoolhouse be commodiously built and neatly kept; the architecture and the appurtenances of the house should be tasteful and agreeable to the eye, that the objects constantly associated with the exercises of the pupils may tend rather to refine than to vulgarize their minds, to win their affection and care rather than inspire contempt and promote mischief. In poor districts the building must indeed be of cheap materials and plain workmanship. But then what need of putting children to be educated into such miserable dens of deformity, dirt, and discomfort as are many of the hog-sty-looking schoolhouses of the "ancient domain"? When the seminaries of the land are such nests of filth and vermin, what must the teachers be? and what the education of the pupils whose young ideas are taught to "shoot" in such gardens of knowledge and refinement?



There is small excuse for complete ugliness and bareness in any school yard, especially in the country. A teacher of ability can interest pupils in some plan for improvement of the yard. Shrubs and trees may be set out, not here and there, or in monotonous order so that they emphasize the bareness, but in masses that furnish a pleasing setting for the building and a homelike appearance to the yard. A school yard in which landscape gardening is done for the pupils by outsiders is likely to suffer from thoughtless trampling and destruction. A school yard whose improvements are planned and carried out with the co-operation of the children will generally be guarded and cared for by them, and such guardianship is effective. The public spirit engendered by such a plan regarding the premises is a most valuable element of education and bodes well for future citizenship.

The changes in appearance and environment of school build-

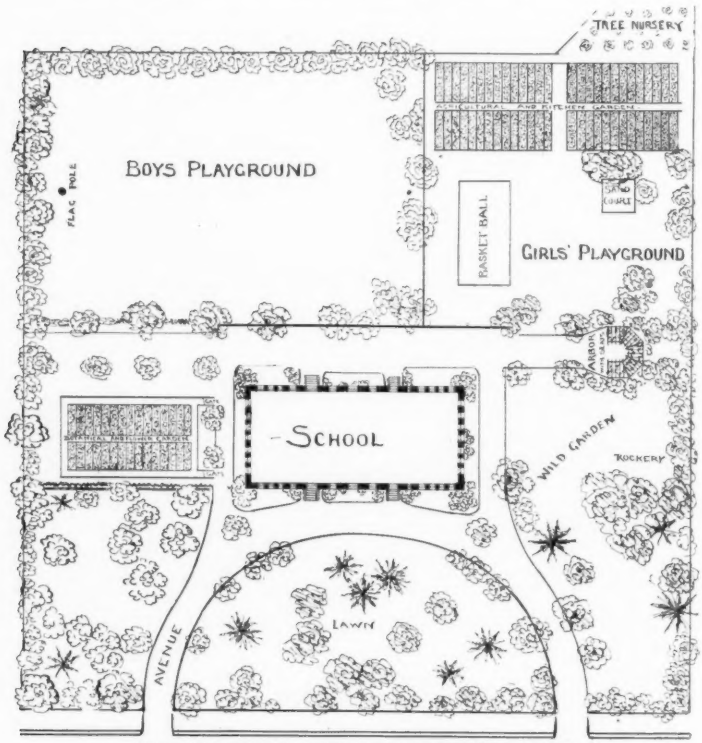
ings are the visible signs of one phase of the evolution of the idea of democracy in America. An old school law in New England in the seventeenth century begins thus: "Inasmuch as the good education of children is of singular behoof and benefit to any commonwealth." In various parts of the country, educational leaders have voiced the same thought. Its interpretation

INTERIOR OF MILWAUKEE SCHOOL, SHOWING WELL-DECORATED WALLS.

has been increasingly liberal. Now and then the mediæval idea that education is a matter only of private concern has struggled for supremacy, and free public schools for the poor, with atmosphere burdened with unwelcome suggestions of public charity, have sometimes existed. But these have given way to free public schools for every class, where rich and poor meet together and the same teacher is teacher of them all.

So practical has been the interpretation of this idea in recent years that in some places those with authority have planned to furnish schools, not simply of a character to meet legal require-

ments and barely satisfy demands, but to give the best schools obtainable. In such communities private schools have languished. There one finds primary and grammar buildings, healthful, beautiful, and pervaded with an atmosphere of good citizenship,



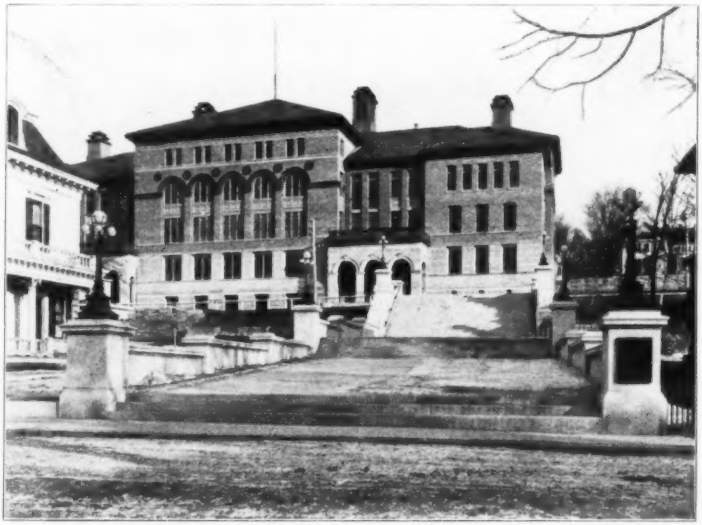
PLAN FOR SCHOOL YARD IN EAST DEDHAM, MASS.

and high-school buildings which furnish a fit place for the education of young people at an age when refined surroundings co-operate powerfully with other influences to produce admirable manhood and womanhood.

Ugly schoolhouses are still altogether too common, but as one travels through the country he finds an increasing number of localities where the schoolhouse stands as one of the most,

instead of the least, attractive architectural features of the town.

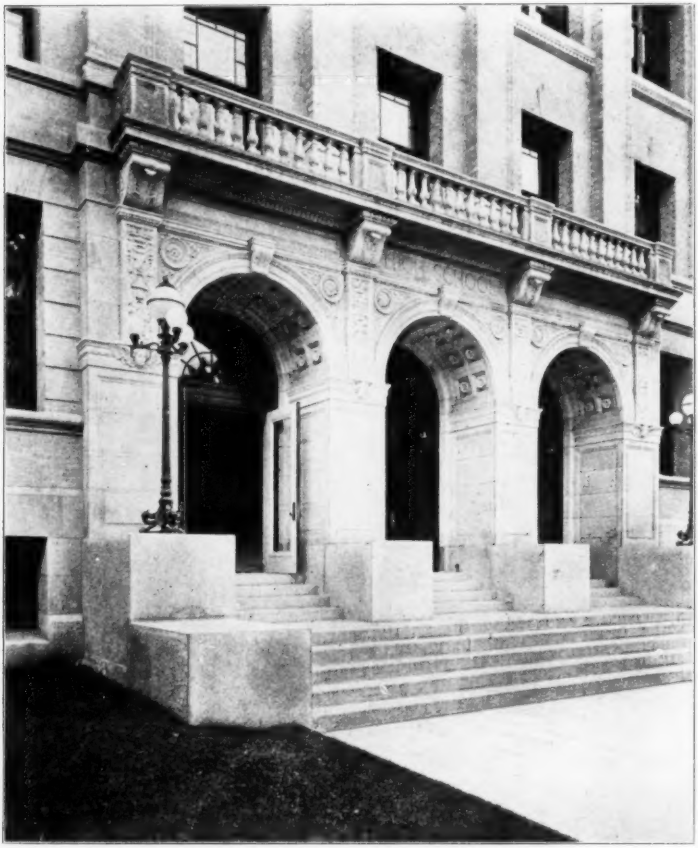
We are in the midst, not at the completion, of the evolution of the schoolhouse. When requirements of health and comfort and æsthetic taste are satisfied, what shall be the next element in its progress? Already we have a hint from the evolution of the



ENTRANCE TO HIGH SCHOOL, FITCHBURG, MASS.

educational idea. The tendency appears to be toward a school environment fitted for children who are to be educated by doing things as well as by studying books; toward rooms with space and equipment for industrial work, instead of having all the floor area occupied by desks where pupils shall sit only to listen and study; toward school yards measured by acres wherever possible, instead of by feet, where part of the work shall be actually to accomplish the process from raw material to useful and well-made product, and to deal at first hand with the facts of plant growth and culture and animal life, the elements with which are associated so large a part of the progress of the race.

Education is a part of life and does not end with graduation. The schoolhouse has possibilities of vital interest for those who are not children. These possibilities find a step toward realiza-



MAIN ENTRANCE TO HIGH SCHOOL, SPRINGFIELD, MASS.

tion in evening schools for all ages. The future promises much along this line. Many school buildings contain an attractive hall where the people of the community assemble for lectures and music and social conference. The coming schoolhouse

promises to be the "guildhall" of the neighborhood, associated with all that is best, and regarded by the citizens with the same quality of affection that the college graduate feels toward his *alma mater*.

It is true, indeed, that "of singular behoof and benefit to any commonwealth" is the proper education of its children, and the most impressive sign that this is appreciated by the American people is the evolution of school architecture from the old 'red schoolhouse" to the modern place of learning.

WALTER SARGENT.

NORTH SCITUATE, MASS.

MAIN ENTRANCE TO PUBLIC HIGH SCHOOL, MEDFORD, MASS.

HIGH SCHOOL ARCHITECTURE IN THE CITY OF NEW YORK.

New York city—that is, old New York, now known as the Borough of Manhattan and the Borough of the Bronx of the "Greater City"—seven years ago did not have a single high school, either faculty or building, as part of the municipal public-school system. Today within the boundaries of that same New York the faculties of five great secondary schools—two for boys, two for girls, and one for pupils of either sex—and of a complete training school for teachers, are demonstrating with 9,176 pupils the civic value of high-school education, which the powerful eastern metropolis was alone, among the large cities, in not affording to its junior citizens.

These high schools have in every instance sprung up full-fledged into a maturity of accomplishment, if not of history. Three of them began their work in 1897, under the late Mayor Strong's board of education, in cramped and temporary quarters in old elementary-school buildings. The popular demand for admission to these new schools was so instant and so unmistakably genuine that within a few months a large number of temporary "annexes," in rented buildings for the most part, sprinkled all over the city and often miles away from the parent school, were opened. An administration avowedly hostile to high schools succeeded that of Mayor Strong, but instead of interfering materially with the evolution of such education, the new board of education saw the light, was converted, and, under the leadership of Miles M. O'Brien, began the erection of a building for a fourth secondary school, the High School of Commerce, the establishment of which had long been advocated by City Superintendent William H. Maxwell, an ardent believer in post-elementary instruction. The fifth high school, the Girls' Technical, began its work last September in two down-town buildings vacated by the Wadleigh High School for Girls, which moved into its new home in West One Hundred and Fourteenth street,

near Seventh avenue, at that time. The Training School for Teachers—which cannot of course be considered a high school, although it must be reckoned as a contributor to higher public education—is located on the upper floor of a modern elementary building, the lower floors of which accommodate a model primary and grammar school, where training-department pupils take their "observation lessons." Already, however, Dr. Maxwell is talking in his annual reports of the need for a sixth school—a manual-training institution; and the probability is that a few months more will see old New York in possession of a round half-dozen of secondary schools as monuments to her progress in this direction within the last seven years.

But if the rate at which high-school faculties have been organized and set to work has been rapid, buildings to house these faculties have been provided at a pace almost equally speedy. Starting seven years ago altogether high-school-less, old New York today boasts as a model of its kind one completed high-school building, two equally fine structures now so near completion that they will open in September, and the plans for a fourth building, the contracts for which will be awarded before the end of the school year. The completed structure is the Wadleigh High School in West One Hundred and Fourteenth street, on the H-shaped floors of which 2,800 girls can be at work without interfering with one another. The buildings to open in September are: (1) the Morris High School, a towering collegiate Gothic structure, for 2,735 boys and girls, located on a sort of plateau at One Hundred and Sixty-sixth street and Boston road; and (2) the School of Commerce, Sixty-fifth and Sixty-sixth streets, near Broadway, where 1,750 young men will be taught the science and art of business. The building now on the drafting tables is that for the De Witt Clinton School, for 3,500 boys, to be built in Fifty-ninth street and Tenth avenue. It is expected also that it will be only a few months before at least one other high-school building, the fifth, will be in process of erection west of the East river.

But it must be remembered that all of these high schools are in old New York. If present New York is to be taken into consid-

eration, three other high-school buildings must be added to these four in order to compute progress in this line during the last seven years. The three others which have been co.nmenced since consolidation, January 1, 1898, are: (1) the Long Island City High School, Borough of Queens, now nearly ready to receive as pupils 1,500 boys and girls; (2) the Richmond Borough High School No. 1, for 750 pupils, the date of completion of which falls in 1904; (3) the Manual Training High School, in Seventh avenue, Brooklyn, the shops and class-rooms of which will accommodate 2,500 pupils after an early date next year.

These seven high-school buildings, with their sites, will cost, when completed, in the neighborhood of $5,000,000, all appropriated in seven years for this purpose. In the same period, however, New York did not neglect its elementary schools. In fact, the city appropriated for the latter, of which some 140 buildings and additions for nearly 200,000 children have been built or put under way since 1897, the sum of $30,000,000 in round figures. This makes New York's local expenditure for new schools of all kinds in the last seven years $34,689,794, to which might be added the sum of $3,307,558, spent in 1896—a practical testimony to local public sentiment. What is more to the point is that this money has gone, all of it, for schools, and has not been diverted into the pockets of politicians. In a way this is typical of one phase of New Yorkism—the public will not "stand for" the robbery of the children. "The best is none too good for the little citizens" is the same thing said another way. And yet this $38,000,000 of total spent or appropriated for new buildings since January 1, 1896, represents only what has been done in the past. For the future, as the bills for the next year or two, must be added a million or so more for new high schools—perhaps three millions—and a dozen or so millions for elementary schools. Then, when New York has caught up, she can settle down to a steady expenditure of $3,500,000 each year to care for the net increase in school population—an inexorable 25,000 per annum. But if the present rate of expenditures is kept up in ratio to needs, the cost of school

construction for the decade ending in 1906 should be somewhere around $50,000,000.

It would be interesting to trace the scholastic history of these high schools through days of vicissitude and opposition up to the present time, when Mayor Low's administration, pledged to build schools enough for all children, and living up to that pledge most generously, is in office.

This article, however, has to do with architecture rather than pedagogy, and consequently must deal with the work of the school architect, Superintendent of School Buildings C. B. J. Snyder, who fashioned the walls of brick and stone, rather than with the constant and victorious battle of the pedagogical architect, the city superintendent, who devises courses of study and insists on the civil-service system of appointing teachers. Let us suppose, therefore, that the school has been organized, the subjects to be taught determined, the attendance completed. The work of the pedagogical expert ceases here for a time, and a call is sent to Mr. Snyder to build a home for the school. This he does, fashioning it carefully to meet pedagogic requirement; a year or so later the school begins housekeeping in a new structure handed over by the building bureau.

This division of labor is just what happened in 1897, when the state legislature, as was required at that time, authorized the expenditure of $2,500,000 for new high schools. The superintendents determined what the schools were to be in nature, and then Mr. Snyder and his assistants started out to build the architectural vestment to fit the measurements of the body scholastic. Now, Mr. Snyder up to this time had never built a high school, and the problem, which was to construct three and possibly four secondary buildings — the finest in the United States — was not one permitting of experiment. The product must be a perfect thing of its kind — not an attempt. Mr. Snyder, however, had built elementary schools — scores of them — and he fell back upon this experience, after a thorough investigation of existing high schools, to aid him to build high schools of his own. In fact, in the first school erected he departed from all known plans for such structures, and made what might be called

a glorified, enlarged edition of an H-type elementary building to house the laboratories, lecture-rooms, and whatnot, of the higher curriculum operated on the departmental system of instruction. The product is the Wadleigh High School, and that its evolution from a grammar building was a success is demonstrated visibly well enough to need no verbal affirmation.

After all, as the architect discovered, the problem of erecting a high-school building in the crowded sections of a populous city differs very little from that of putting up an elementary school under the same conditions, save only in the matter of size and in the internal arrangements of rooms to fit the differing course of study. The desiderata for any schoolhouse—city or country, secondary, grammar, or primary—are these:

1. Light from the sun, falling in the proper direction on every pupil's desk, and on the blackboards and other wall spaces.

2. Air in sufficiency to supply each pupil with a definite volume of pure breathing-stuff, whether by natural or artificial means, every minute.

3. Even temperature, maintained at a normal point.

4. Safety, which includes protection against fire and panics, and also proper sanitary conditions in the class-rooms and in the toilets.

5. Floor area and interior space, which imply the allotment to each pupil of enough living-room to allow him to be a functional animal.

6. Economy, with the stipulation that the other five elements be considered absolute essentials to be had irrespective of cost. Economy here means the seeing to it that the expenditure per pupil is as low as it is possible to have it without militating against the working quality of his school.

7. Accessibility and the placing of the school where the children are; and that means a site in a crowded neighborhood or a center, which, in its turn, implies a high price per foot-front for land.

It is, of course, a fairly simple matter to satisfy these requirements where a large country site is ready to hand for the archi-

tect, or if, in the city, he has a block front property on a broad avenue as a location for a large schoolhouse. Under such conditions it is no difficult matter to satisfy all requirements, except No. 6—economy. Lots in an avenue and corner lots anywhere below the Harlem river are so valuable, especially if they are near centers of population, as to be practically prohibitive in price. This forced the school architect to devise a new type of building which should satisfy these various demands and at the same time be so absolutely independent of its neighbors that "sky-scraper" tenements could be placed all around it without affecting the educational usefulness of the structure, and yet not make necessary waste of ground or the purchase of gilt-edged property.

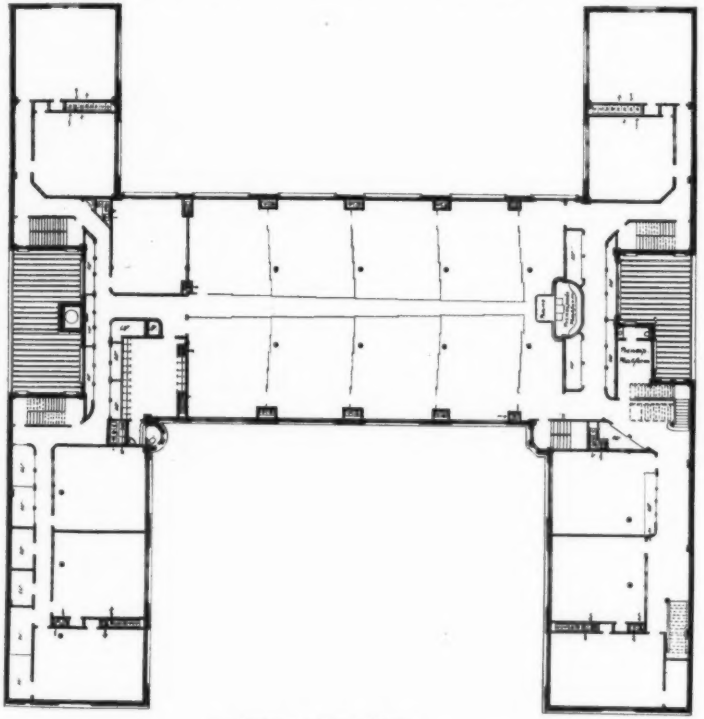
THE H-TYPE OF SCHOOL BUILDING.

The result of Mr. Snyder's experiment was the H-type of schoolhouse erected on a site in the middle of the block and running through from street to street with practically the same frontage on either thoroughfare. The H-type schoolhouse takes its name from the fact that, as is shown in the accompanying cut, its ground plan is laid out exactly in the shape of a capital letter H.

The vertical lines of the H run along party lines of the site from street to street. The cross-bar crosses the middle of the site as a building joining two long wings, and, of course, is parallel to the street line. The building when erected is like a five-story letter H lying on its back. Seen from front or rear —though which is which is hard to determine—the structure is a building erected about three sides of a large court, open on the street front. This effect is shown admirably in the illustrations. All the windows for the building—and a large percentage of the lateral surface is devoted to window openings—are on these courts and in the street ends of the party-line wings. The walls along the party lines are absolutely blank, except for air-shafts to give light to the stairways at either end of the cross-bar building. The party walls are built of common building brick, as it is expected that tenements will entirely hide the sides of the building to its full height. This makes possible no

PUBLIC SCHOOL No. 165, BOROUGH OF MANHATTAN — ILLUSTRATING "H" TYPE OF ARCHITECTURE.

little saving in the matter of ornamental brick. Inasmuch as the class-rooms get all their light from the streets and the big street courts, it is immaterial what sort of building is erected on adjoining property or even that directly opposite. Under this



— Second Story Plan —
— Public School № 165 —
— 108th to 109th St. bet. Amsterdam Ave & Boulevard —
— Borough of Manhattan, New York City. —

C. B. J. Snyder
Supt. of Bldgs. of School Bldgs.

scheme, a fireproof, steel-skeleton building of forty-eight class-rooms, gymnasium, workshop or cooking-room, kindergartens, and a large indoor playground, as well as the two open-air yards, can be erected on a site 150 by 200 feet or twelve city lots. The arrangement includes also a system whereby large assembly halls can be provided by sliding back the doors of class-rooms

PUBLIC SCHOOL No. 165, BOROUGH OF MANHATTAN — ILLUSTRATING "H" TYPE OF ARCHITECTURE.

in the cross-section of the building. Hereafter, however, the assembly hall is to be put in one of the courtyards underneath a playground raised somewhat above the street level. The cost for such a building for 2,400 pupils, complete in every respect, and constructed of the best material and equipped with the most modern of appliances, is in the neighborhood of $370,000.

THE WADLEIGH HIGH SCHOOL FOR GIRLS.

This description of the H-type of elementary-school building has been given because it shows exactly the source of the design for the first new high-school building to be erected in old New York. This building for the Wadleigh High School for Girls occupies a site having a frontage of 225 feet in West One Hundred and Fourteenth street and West One Hundred and Fifteenth street, and a depth of 200 feet—the width of the block. The east party line is 100 feet west of Seventh avenue. In every respect the building is a monster H-schoolhouse, fronting on One Hundred and Fourteenth street, but it varies from its elementary precursor in that a tall tower rises from the inside western corner of the front court far above the basement and five upper stories and the great peaked roof, and in that the rear court, as is shown in the plans, contains a large assembly hall two stories in height, which in no way interferes with the light of the adjoining class-rooms. The tower is shown in an accompanying photograph, but it is impossible, owing to the fact that it faces on a street only sixty feet wide, to indicate the H-shape in such a picture, because no one has been able to get a view showing more than one-half of this mass of brick and stone.

In architecture the building is of the modified Francis I. type. It is constructed of red brick and buff Indiana limestone with terra-cotta trimmings. The roof is of light green slate with copper ridge rolls and flêche. The 200-foot party walls are of common building brick. The structure is, of course, of fireproof steel-skeleton design, with a large margin of stress-safety provided in order to make possible the great window openings without weakening the walls and floors.

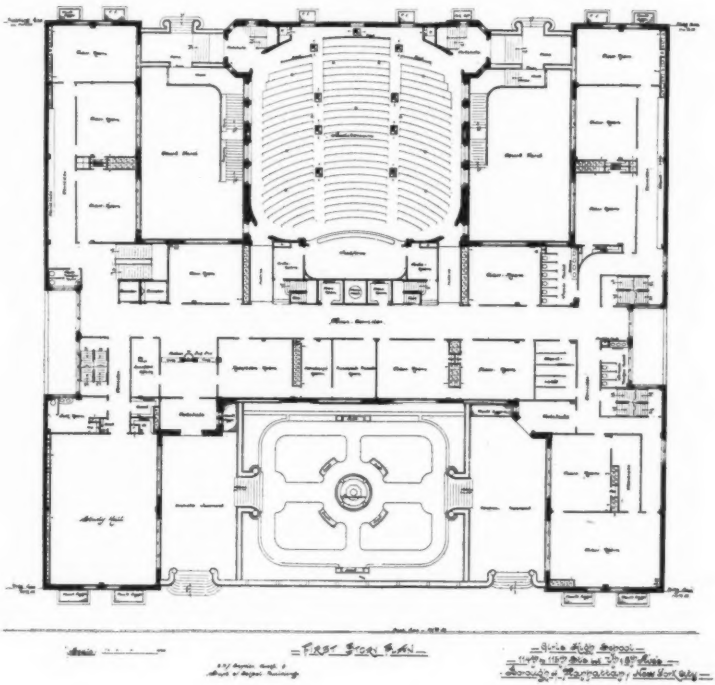
The front courtyard, as is indicated in the accompanying floor plan and suggested by the illustration in perspective, is excavated

THE WADLEIGH HIGH SCHOOL FOR GIRLS, BOROUGH OF MANHATTAN.

to the level of the basement floor so as to provide light for a lunch-room having 10,500 square feet of floor space, a large bicycle storage-room, teachers' dining-rooms, a kitchen, and ample toilet- and retiring-rooms. The engines, with the exception of the electrical apparatus which operates the great twin elevators, each with a capacity of an entire class at one trip, are located under the auditorium in the rear court—a plan which puts the huge boilers, engines, heating apparatus, and blowers for furnishing each minute under the Plenum system a fixed volume of pure heated air drawn from above the dust line, away from under the building, and thereby increasing the element of safety.

The first floor, which is slightly above street level, may be entered from either corner of the front or rear courts, or directly from One Hundred and Fifteenth street through the rear of the auditorium building. Entering, say, through the tower entrance, the visitor finds himself in a sort of foyer fronting the elevators and with one of the many sets of double iron stairways, glass inclosed, to its left. From this foyer, a great corridor, tessellated and with marble wainscoting, runs the length of the cross-section past the stage-end entrances of the auditorium's first floor, the principal's and administrative offices, and a double row of class-rooms. From this main corridor, at either end, the side hallways run along the party walls, past rows of class-rooms opening on the courts. This corridor construction is the rule practically on all floors, except that in some cases the street ends of the wings are given over entirely to gymnasiums or big laboratories, lighted at the end from the street and along the side from one of the two courtyards. The auditorium is directly opposite the center of the cross-section, and as far as stage and dressing-rooms are concerned, is part of the main structure. The banked seats in the lower floor and the gallery, however, are under the auditorium's own peaked roof, which is on a level with the second story of the structure proper. Broad alleyways at either side of the auditorium serve as a means of lighting for the auditorium, and also for the first- and second-story class-rooms which open on the rear court. Besides the unusual features, this floor provides for twelve class-rooms, a study hall, sick-rooms and toilets, retiring-rooms and wardrobes.

As the visitor inspects this floor and those above, he will be struck by the fact that in construction, fittings, means of communication, and conveniences the building is more like one of the new Broadway office structures than a schoolhouse.



The second floor, with the exception that it gives entrance to the gallery of the auditorium, which brings the seating capacity of that hall up to 1,200, is devoted to fifteen class-rooms, a study hall, and the usual conveniences. The third floor, which from its rear windows looks down on the roof of the auditorium, is devoted entirely to actual instruction. It contains eight class-rooms, a study hall, a drafting-room, a special gymnasium, the chemical and physical laboratories, their lecture, apparatus, and preparation rooms and toilets, retiring and teachers' rooms,

wardrobes, etc. The floor above is devoted mainly to laboratory work. It contains, beside six class-rooms, a cooking-room, a drawing-room, a physiographical laboratory, three physical laboratories, a physical lecture-room, the necessary shops, apparatus and preparation rooms, a subsidiary gymnasium, toilets, etc. The gymnasium proper, with its running-track, shower baths, locker, dressing, toilet, retiring, and director's rooms is on the fourth floor, which it shares with three biological and two physiological laboratories, the aquaria, specimen and preparation rooms, and five class-rooms. The sixth floor is devoted to retiring-rooms, toilets, and wardrobes. The rooms of the upper part of the tower are set aside as studies or research laboratories for faculty members.

The total cost of this building, when entirely furnished and completed, will be in the neighborhood of $600,000. Some time ago the architects prepared the following tabulated statement showing the cost of this building as compared with that of an ordinary elementary school and with high schools in other cities:

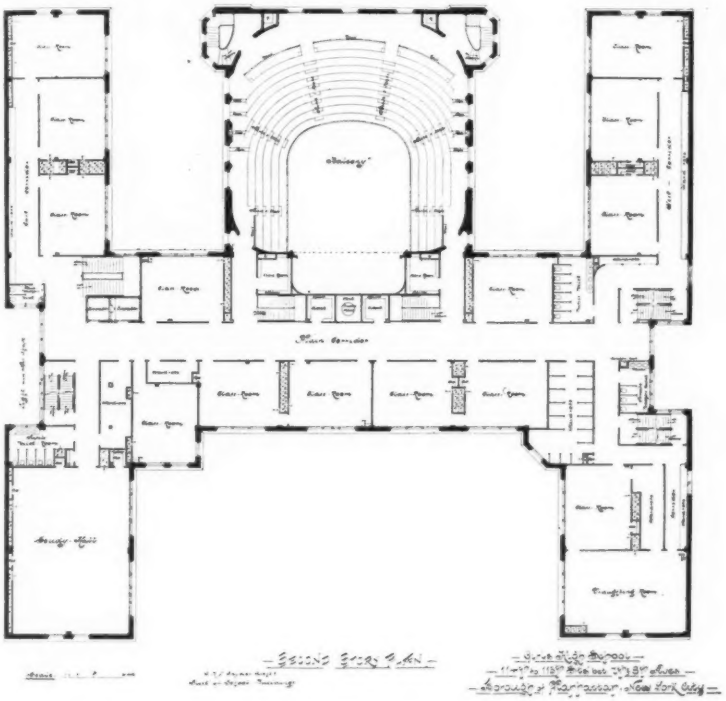
	Springfield High.	New York Forty-eight Class-Room Building.	Boston Dorchester High.	East Boston High.	South Boston High.	Estimated cost of new Wadleigh high school complete: present contract, $487,000; heating, lighting, ventilation, furniture, plumbing, $113,000.
Cost of completed building.....	$340,000	$369,900 (if used as a high school)	$300,000	$278,000	$310,000	$600,000
Number of pupils to be accommodated.....	650	1,500 (if used as a high school)	650	504	672	2,571
Number in class-room.....	20	35	24	42	42	35
Cost per pupil..	$523	$237	$476	$552	$461	$233

From this it appears that the designer of the Wadleigh structure had reason to believe that the element of economy also had been properly appreciated. The seating capacity of the Wadleigh has been somewhat increased recently, and this will lower the per capita cost.

THE MORRIS HIGH SCHOOL.

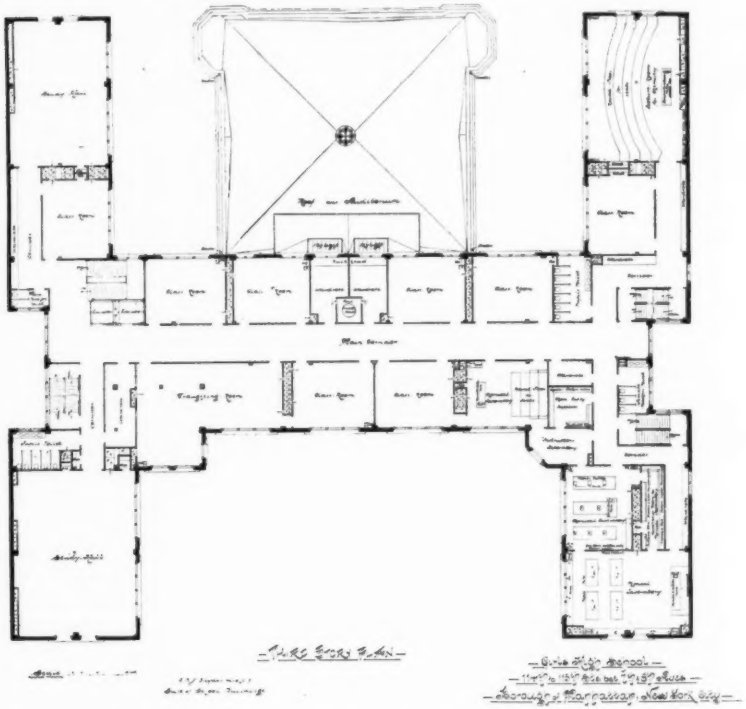
(Known at one time as the Peter Cooper High School.)

The second of the "Old New York" high schools to be erected is the Morris High School, One Hundred and Sixty-sixth street, Boston road, and Jackson avenue, the Bronx. No espe-



cially difficult problem confronted the architect here, except the fact that the excavations had to be made in solid rock — a condition partially overcome by a rather neat adaptation of the building to the natural grade of the property. The site has a frontage of the full block on One Hundred and Sixty-sixth street and occupies a large space back on the line of the avenues. The elevation of the property also contributed to the chance for architectural effect. Here there was no need for planning a school

like an apartment house to fit a peculiar site. The architect, therefore, followed the usual formula in determining his ground plan—a long building with terminal wings, extending 312 feet along the frontage, the rooms in which are lighted from the street, from the avenue ends, or from the rear property. To

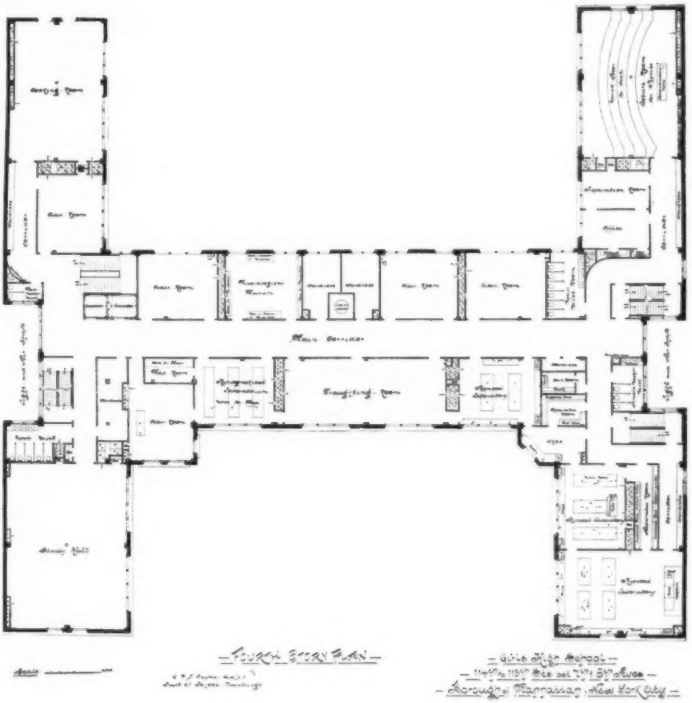


this front building as an attachment in the rear, an auditorium building, two stories high, seating 1,800 persons, was added, and the effect was to heighten the artistic appearance and to enhance the architectural design, rather than to lessen it. This is shown admirably in the illustrations, giving front and rear views of the school.

The building architecturally is of the English collegiate Gothic type, with five full stories and basement. It is con-

structed of carefully harmonized gray brick and stone, with terra-cotta trimmings of the same shade.

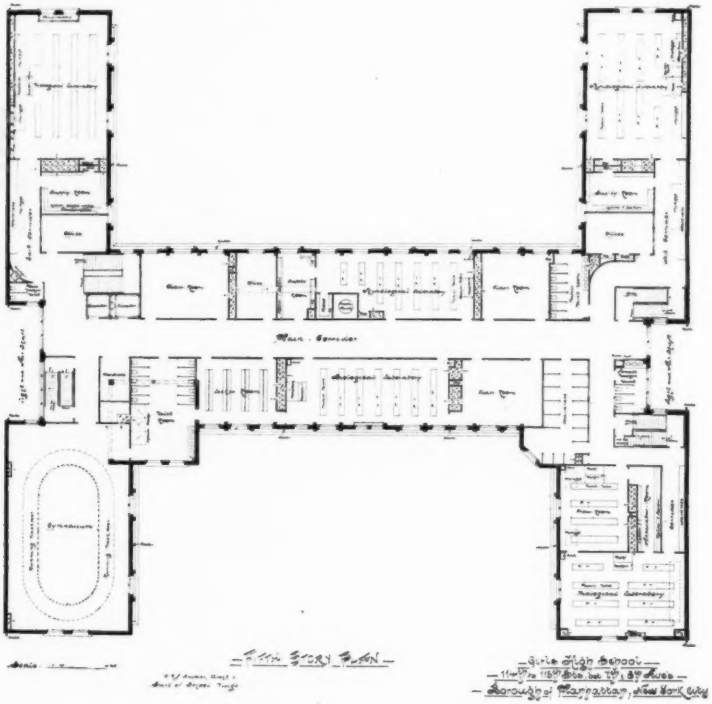
Whatever has been said about the material, interior fitting, convenience, and equipment of the Wadleigh High School applies equally to this structure, and for that matter to all schools now



being constructed in New York city. All are schools with the appliances and accessories of great office buildings. In all of them the latest devices for heating and ventilating, the most approved plumbing and sanitary arrangements, the latest type of engines, the most approved system of fireproofing and construction, the latest discoveries in furnishing, are employed.

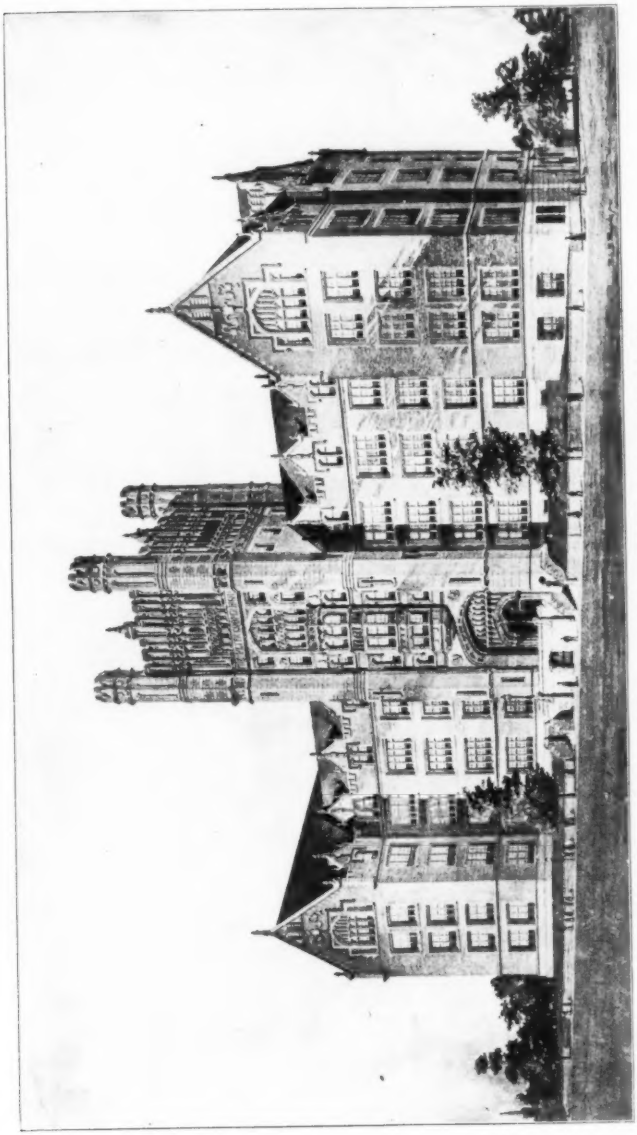
The striking feature of this building is, of course, the tower, fifty feet square, rising to a height of 180 feet out of the center

of the structure. This tower, however, is not entirely for ornament. It conceals the huge smokestack and the great ventilating ducts which draw off the vitiated air. From the rear, however, the detail of the auditorium building also stands out strongly, because in this case the auditorium is placed, not



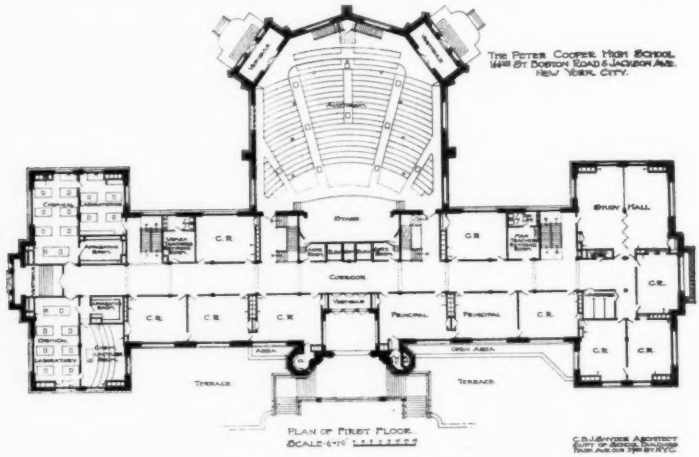
between two wings, but independently, on the beautiful campus. One is tempted to let his fancy run ahead a trifle in order to see ivy climbing about the mullioned windows.

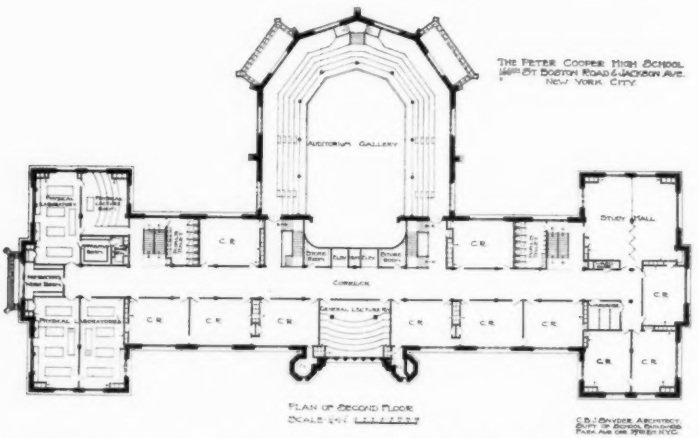
On the various floors of this building are, exclusive of toilet-rooms, wardrobes, engine, store, and apparatus rooms, seventy-seven rooms, of which forty-six are section or class-rooms. These class-rooms are, in dimension, roughly 21 by 28 feet, with the length along the light side. Each room is lighted by win-



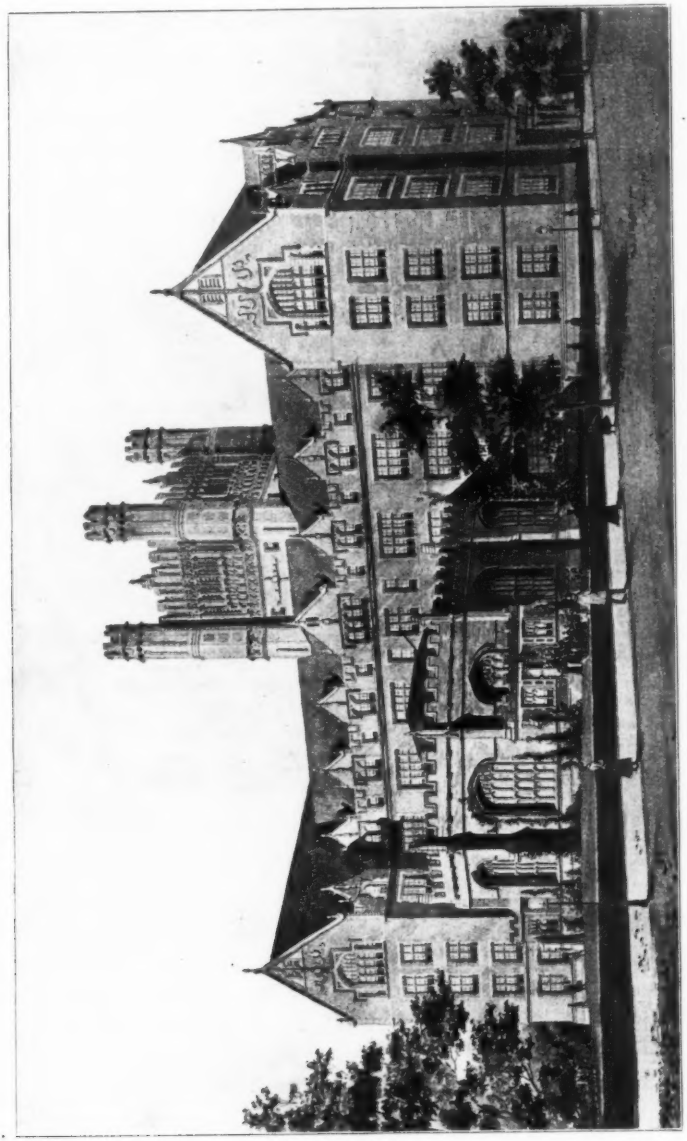
THE MORRIS HIGH SCHOOL, BOROUGH OF THE BRONX.
(Known at one time as the Peter Cooper High School.)

dows, not more than twenty feet away from any desk, which give a light opening of at least ten feet high by sixteen feet wide for each class. Beside these section-rooms there are twelve



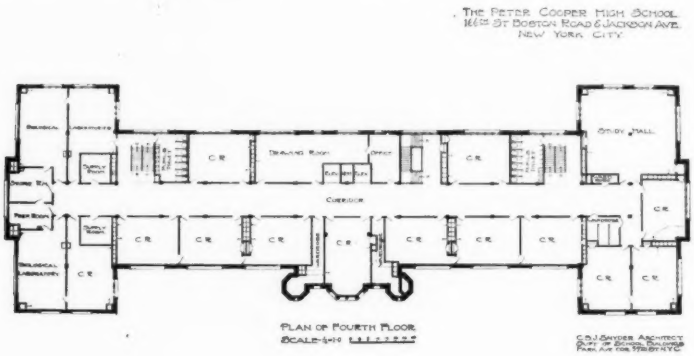


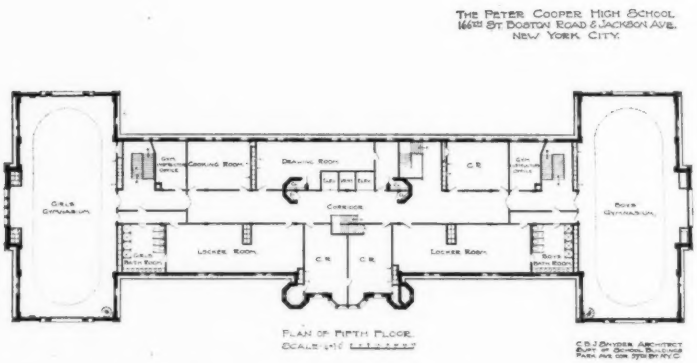
laboratories — chemical, biological, physiological, physical, physiographical — and three lecture-rooms to be used in connection with them. There will be provided also four large study halls and a very spacious library. As this school is to be for boys



THE MORRIS HIGH SCHOOL, REAR VIEW.

and girls, many of the features are provided in duplicate. This of course is the case of toilet-rooms, resting-rooms, etc. The most striking instances of this, however, are the twin-gymnasiums—one at either end of the top floor. Each gymnasium is





provided with a full equipment of apparatus, a running-track, shower baths, locker, toilet, and directors' rooms, and modern conveniences. The spare rooms in the upper part of the tower are given over to private research laboratories for the instructors in science.

The basement contains ample lunch-rooms for each sex, bicycle-rooms, and other conveniences. The engine plant—

dynamos, high-speed engines, boilers, heating apparatus, ventilating machinery — is for the most part located in the sub-basement in the Jackson avenue end of the building where advantage was taken of the natural gradient.

The following printed table gives an idea of the cost of construction for this building:

	Wadleigh High School.	Morris High School.	
Cubical contents	2,954,000	2,721,807	
Contract cost for general construction, contract now let	$487,000.00	$469,383.00	(which includes 8,000 cubic yards rock excavation, while total excavation for Girls' High School only costs $6,000).
Estimated cost for building complete, with sanitary heating and ventilating, furniture and laboratory fittings	$600,000.00	$583,000.00	building completed.
Estimated cost per cubic foot, less rock excavation	20.37 cts.	20.53 cts.	(in which buildings are compared on same basis, *i. e.*, with no rock excavation in either).
Number of pupils	2,600	2,735	
Cost per pupil of buildings complete, as it would appear were they erected on similar soil	$230.70	$204.38	

Actual cost of completed building per pupil, notwithstanding the disadvantages of site, extra haulage, etc., $219.30.

The two high schools are similar in arrangement of section-rooms, auditorium, laboratories, lecture-rooms, etc., but the Morris High School has two gymnasiums (one for boys and one for girls), each of which is as large as the one in the Girls' High School.

THE HIGH SCHOOL OF COMMERCE.[1]

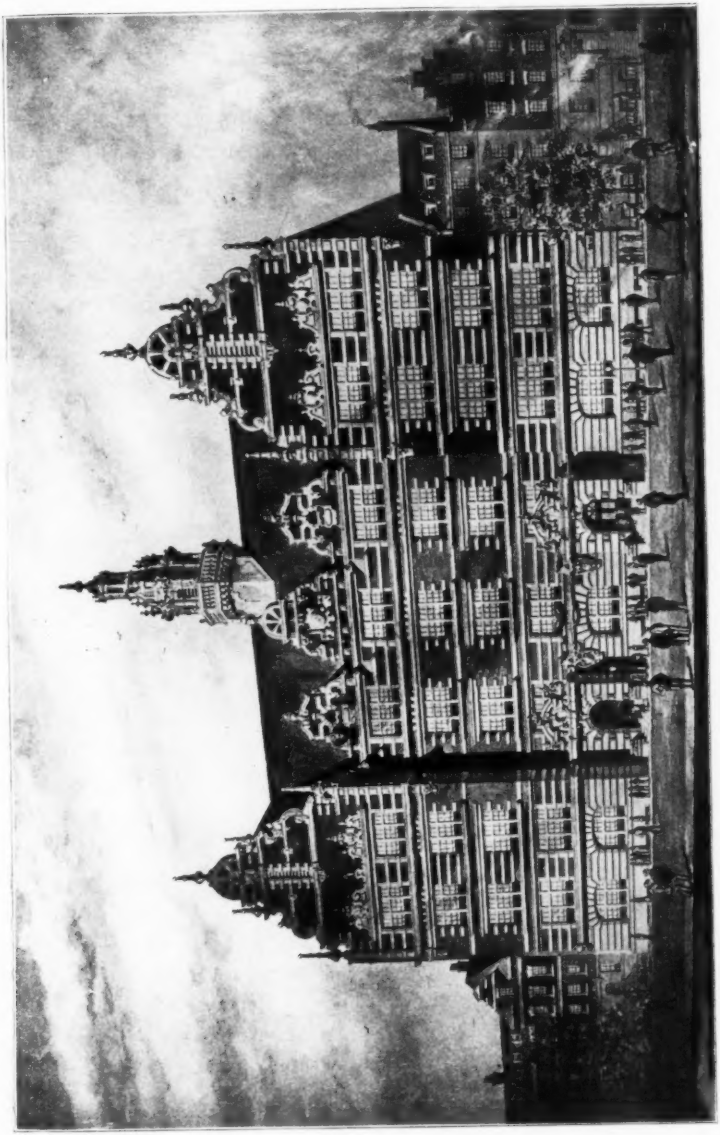
The High School of Commerce, soon to be opened in Sixty-fifth and Sixty-sixth streets, near Broadway, offered a problem in construction even more difficult than did the Wadleigh High School. The nature of this school made a site in the middle section of the city wise. Property in this district is of course very expensive. The city already owned a site for a grammar school at this point, and it was determined to utilize it for a

[1] The illustrations of the building and of the floor plans will be published in the September issue of this journal, which will be devoted specially to commercial education.

high school. The property consisted of a plot with a frontage of 150 feet in Sixty-fifth street and a frontage of 100 feet in Sixty-sixth street, a middle of the block parcel somewhat irregular in shape. The manner in which this problem was solved, and a school for 1,750 students of commerce in a school giving both a four- and a five-year course, is shown clearly by the cut of the floor plan accompanying this article.

The architect determined to construct what are practically two independent buildings, each occupying the full frontage. These two buildings are connected in a rather novel way. On the ground floor the connection is through an auditorium building which has its foyer in the Sixty-sixth street structure and its stage and dressing-rooms in the Sixty-fifth street part. This auditorium rises for two stories in the great central court just as does the Wadleigh's similar addition, and consequently does not interfere with the light and air of the class-rooms in the interior of the two buildings which open on that court or the subsidiary air courts at the inner corners of the Sixty-fifth street plot. Connection between the upper floors is had through a sort of bridge or causeway spanning the great inner court.

The building externally was designed with a view of securing for this school a business-like appearance which at the same time suggests its scholastic purposes. This has been accomplished without disregarding the requirements of light and air. The interior arrangement of the building had perforce to be adapted to the peculiar needs of this school, which is organized on ambitious lines. Its purpose is to be, not a business college, as that term is commonly understood, but an institution which will fit young men for managerial and other higher positions requiring expert knowledge in the world of trade, and to prepare them as far as possible for the consular service. The course insists strongly upon broad general training, with especial emphasis on languages, beginning with English. In addition to this it will offer thorough courses in business methods, including accountancy as well as routine bookkeeping; special courses in foreign trade and exchange, insurance, brokerage, and other operations of a similar character; in the history of commerce,



THE PROPOSED DeWITT CLINTON HIGH SCHOOL, NEW YORK CITY.

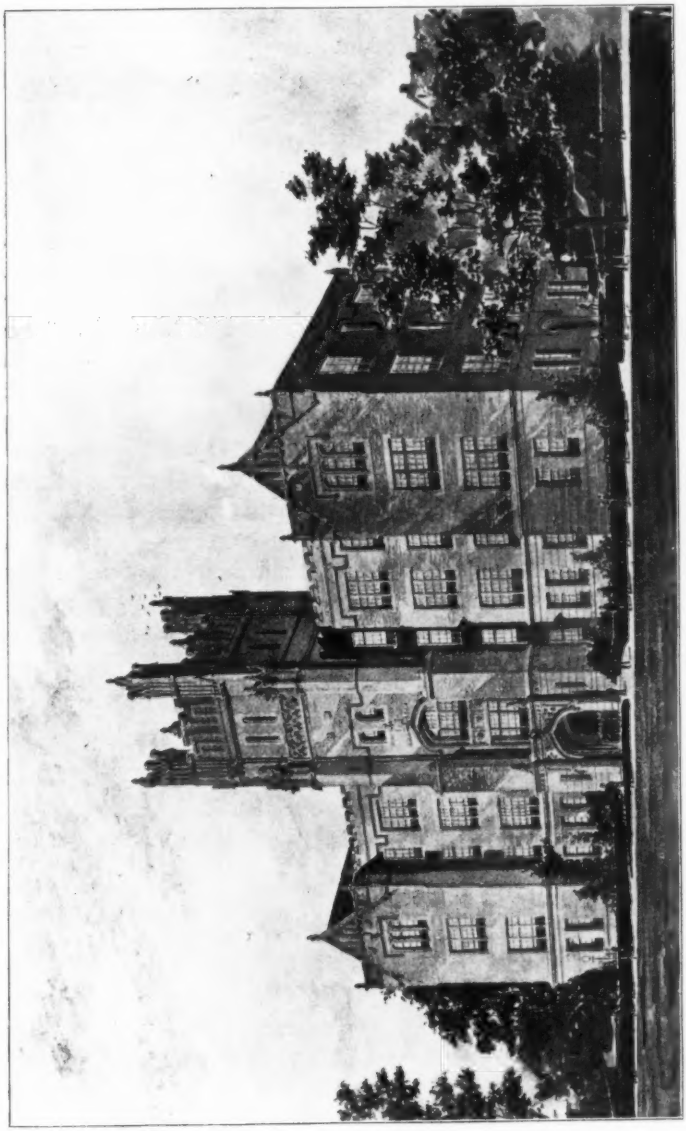
in commercial law, and in foreign customs and commercial practice. These courses, dealing in part with the theory and science of trade, will be supplemented by instruction in the laboratory in technology, in chemistry, and in other sciences applicable to business. Such a course requires great testing-rooms, museums, libraries, special laboratories as well as the usual class-rooms and study halls, a model gymnasium and swimming pool, and conveniences of the regular high school. All of these elements have been cared for, and ample space has been allotted to them, so that the building will provide a very practical workshop for young men learning business by actually performing the operations by which business is conducted. The cost of the structure is $302,040.

A SUGGESTED HIGH SCHOOL.

The illustration and floor plan of the De Witt Clinton High School are to be regarded merely as suggestive. This structure has not been built, owing to a determination to use another site. It shows, however, a method of building a high school around a central courtyard. This school, which was for 3,400 pupils, would have provided the following accommodations: class-rooms, 70; laboratories, 14; lecture-rooms, 2; study halls, 3; library, 1; gymnasiums, 2—a total of 92 working-rooms. There would also have been a large auditorium, lunch-rooms, toilets, store-rooms, wardrobes, a swimming bath and showers, and space for the engines, etc. The exterior of the building was to follow the Netherlands architecture, in order to mark the fact that its site near Stuyvesant square was associated with early Dutch history. The original low bid on this building was $548,184.

RICHMOND BOROUGH HIGH SCHOOL NO. 1.

The Richmond Borough High School No. 1 occupies one of the finest school sites in the city. It is on high ground in St. George, Staten Island. It offered no problems of special architectural difficulty. As will be seen from the illustration taken from the plans, it will be in a way a sort of small replica of the Morris High School. It will have no auditorium, however. The building is constructed to accommodate 750 pupils of both sexes



RICHMOND BOROUGH HIGH SCHOOL, NEW BRIGHTON.

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in a regular high-school course. For these it will afford an ample number of class-rooms, laboratories, a kitchen, and a manual-training room. The cost of erecting the building will be $164,900.

THE LONG ISLAND CITY HIGH SCHOOL.

The Long Island City High School, to be erected in Wilbur avenue and Radde street, Long Island City, is about twice the size of the Staten Island school, and yet its capacity, somewhat under 1,500 pupils, makes it rank as a small building compared with the towering structures in the crowded districts. In the case of this school the site was so large as to make unnecessary anything but a straight-away building. It extends along the frontage of the lot and is so planned that an auditorium can be added in the rear where large wings also are possible. Although the building is comparatively small, this fact has in no way influenced the interior nature of the structure. In fittings, material, convenience, and appliances it is as perfect in its way as are the larger schools. The final apportionment of rooms is not yet determined. There will be, however, an ample number of study halls and recitation- and lecture-rooms, in addition to fully equipped laboratories, commercial practice-rooms, a workshop, a kitchen, gymnastic training space, an astronomical observatory; the usual offices of administration, eating-halls, etc.—more than 53 rooms in all. The contract for the erection of this building, 182 by 72 feet, was $190,970.

THE MANUAL TRAINING HIGH SCHOOL.

The building for the Manual Training High School in Brooklyn is now being erected on property occupying a solid block front, 237 feet, in Seventh avenue and 200 feet frontage in Fourth and Fifth streets. This building, when completed, will be the third structure planned especially for the high schools of that borough and will house in suitable quarters one of its six secondary-school organizations.

The fact that the site had a great frontage in three fairly wide streets made unnecessary the use of any forms of building designed peculiarly for the city. The ground plan is compara-

THE LONG ISLAND CITY HIGH SCHOOL, BOROUGH OF QUEENS.

tively simple in character. The building runs around the three sides of the lot and ends about eighteen feet from the party line, thereby providing for an alleyway for the delivery of coal and supplies for the shops. The interior of the building, however, has to be laid out with great nicety, because the school is to provide both a manual and a regular course for girls as well as boys. This made the duplication of certain features essential and also made necessary the provision of shops adapted particularly to handicrafts open to women.

The result of the planning will be a four-story and basement building of the French Renaissance type, with decorative motives typical of its uses. Its capacity will be 2,500 pupils, for whom ample accommodation in shop, laboratory, and class-room will be provided.

The basement, to which entrance will be had directly from Seventh avenue, will provide for the main floor of the auditorium, which will be located in an interior court; for the gymnasium, its locker- and toilet-rooms; a bicycle-room, a large lunch-room, and several studies for experimental laboratory work.

The first floor proper will contain the gallery of the auditorium; two large shops for woodworking; offices; a library; a drawing-room; nine class-rooms, many storage, stock, and toilet and rest rooms.

The second floor will provide two large shops, a music-room, a physiological laboratory, its lecture, preparation, and instruction rooms, drawing-rooms; two sewing-rooms, thirteen class-rooms, and the usual conveniences. The third story, in addition to providing fourteen class-rooms, drawing-rooms, a study hall, and the usual wardrobes, etc., will furnish also two sewing-rooms and two biological laboratories. The fourth floor, with the exception of five class-rooms, will be given to workrooms—the forge-room, the machine shop, the chemical and physical laboratories, three rooms for printing and bookbinding, drawing-rooms, and the domestic-science department. This last-named branch of instruction will be given in a model kitchen and in three rooms where good housekeeping can be taught by practice and observation. In every department the details of furnishing and

equipment will be carried out in every case with the most approved devices. The contract price for the construction of this building is $488,000.

The school completes the last of those actually under way. There remains, however, to be built this year, with money already at hand, what will probably be the largest high school of them all, the De Witt Clinton High School at Fifty-ninth street and Tenth avenue. The plans for this building which will accommodate from 3,000 to 3,500 pupils, are now only in a tentative shape. But it is known that they will provide for a large building erected about three sides of an open court, on a lot 200 by 200 feet. It probably will be of the French Gothic type or an adaptation of it. The high schools to be built after this are not yet planned in any detail. Two pieces of property, one for a manual school and another for the Brooklyn Commercial High School, are in the possession of the board of education, and ready for use. Operations to occupy these sites are succeeding probabilities. Still there are calls from several other neighborhoods for high-school buildings, and it will not be surprising if within the next few years many other great secondary structures rear their walls within the boundaries of Greater New York.

One thing is certain, the present board of education, under the leadership of President Henry A. Rogers, has not deviated from the progressive building policy developed by Mr. Rogers's predecessor in office, Charles C. Burlingham, who returned to the board at Mayor Low's request. The present city administration under Mayor Low, since February, 1902, has granted $11,500,000 for new school buildings, and has not signified that this amount was a limit to appropriations.

It is therefore not unreasonable to suppose that these great building operations are to continue. In fact, they must continue if New York is to provide for the annual increase to her present public-school population, now 510,000 in round numbers, as shown by the reports of actual registration.

G. W. WHARTON.

NEW YORK CITY.

A NEW ERA IN THE PUBLIC SCHOOLS OF ST. LOUIS.

In every annual report of the St. Louis public schools for many years it has been made clear that the revenue at the disposal of the board of education was insufficient. The situation in St. Louis in regard to funds available for public schools is unlike that of any other large city in the country, and requires a few words of explanation.

The constitution of the state authorizes every local board of education to assess and collect its own taxes for school purposes, so that the board of education never submits its budget of wants to the city government. Under the constitution it levies a certain tax upon every dollar of assessed value, the assessed value being determined by the city assessors. Invariably the board uses the machinery of the city assessor and the city collector, and pays for the service, but the money when collected goes immediately into the treasury of the board. The constitution fixes the limit to the rate of the tax levy, which until last November was four mills upon every dollar. The income of this four-mill tax in St. Louis last year was $1,622,842.98.

In addition to this four-mill tax, the board has had the income of a certain amount of real estate which it owns as the residue of what was originally given for the establishment of the schools of the city. This real estate yields an annual income of about $75,000.

Next, the city receives its pro-rata of the state appropriation for public education. This amounted last year to $176,051.89. Other amounts come into the treasury from what is known as the "merchants' tax" and other sources, amounting last year to $206,803.73.

This gross income, as is easily seen, was inadequate to the proper education of the children of St. Louis. Nevertheless, the board of education, of which I have been a member for the last six years, has, by strict economy and careful management, been able to put all schools in the best condition and to construct

many excellent school buildings, and to make other improvements in the way of salaries, manual training, supplementary reading, free text-books, etc. But facilities for secondary education have been strikingly deficient. There has been, and now is, but one high school for white children in the whole city. The isolation of this school from the great majority of pupils has led the people to feel that the district schools were virtually the completion of the public-school course. Nevertheless the course of study in these schools has been distinctly preparatory to a system of high schools, only one of which was in existence. Having no high school in view, three-fourths of those enrolled in the second and third grades have generally dropped out before the seventh grade was reached. This early withdrawal has been accentuated at the close of the "free text-book" period, which has been between the fourth and fifth grades. It is needless to go into an argument to show that this state of things has resulted in great part from insufficient school funds.

It is true that in nearly every city and town in the state, by popular vote, the levy for school purposes has been increased beyond four mills, running up as high as eight or ten mills in many cases; but such a levy requires a vote of the "taxpayers" and all the expensive machinery of an election, which in St. Louis is a very serious matter. Consequently, although sadly in need of funds, the board of education in St. Louis has never felt it to be wise to submit a proposition to increase the tax at any election. It has preferred to make systematic efforts to bring about an amendment to the state constitution.

Two years ago this effort culminated in the submission by the general assembly of a constitutional amendment to the people of the state, the purport of which was that the limit of taxation for the public schools should be raised from four mills on a dollar to six mills on a dollar in the three cities of St. Louis, Kansas City, and St. Joseph. The strength of the argument for the adoption of the amendment was found in such points as these: the increased cost of fire-proof buildings required by law; the desirability of extending the free-book plan all through the grades; an increase in the salaries of teachers; the introduction

of manual training and domestic economy; and, above all, the construction, organization, and maintenance of additional high schools.

The amendment was adopted last November by an overwhelming majority, and next month this board will levy six mills upon every dollar of property in the city, thus adding about $800,000 to its annual income. This addition will increase as the city increases in wealth.

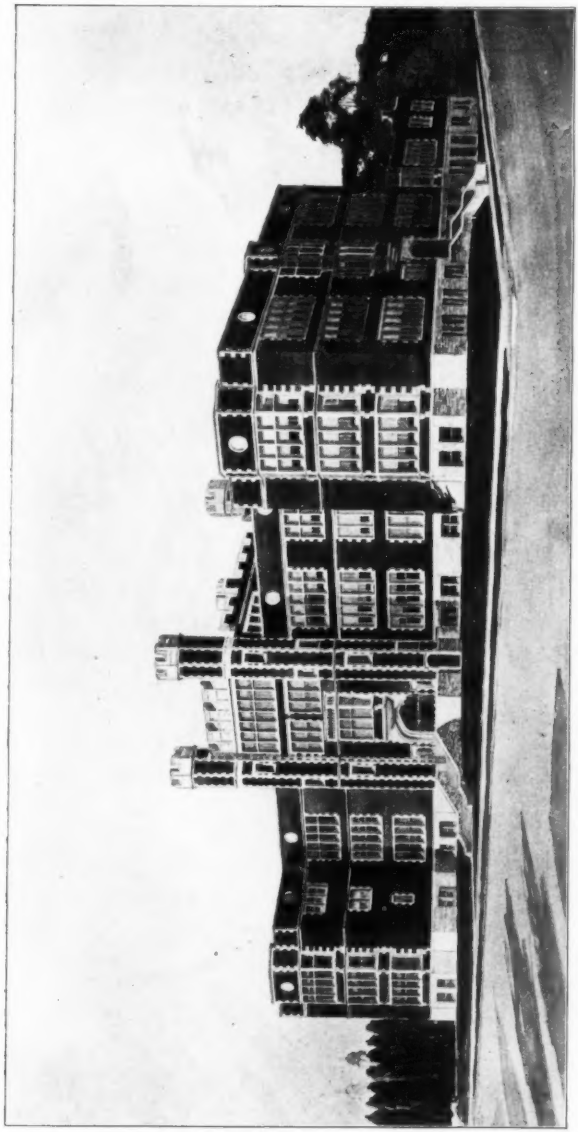
No words can adequately express the importance of this amendment to the educational interests of St. Louis. Almost immediately the board announced free books in all grades after September 1, 1903, and began at once a systematic plan for new buildings and reconstructions. Even before the election, and in anticipation of the adoption of the amendment, it decided to build two new high schools, one in the southern and one in the northern part of the city. Both are now in process of erection, and the work is being pushed as rapidly as possible. Each is a magnificent manual-training high school, to accommodate a thousand pupils, boys and girls, and is to be equipped and furnished in the latest and best style. These schools are very nearly twin schools, though their buildings differ slightly in appearance. Both are shown in accompanying cuts.

The William McKinley Manual Training High School will be ready for opening by February 1, 1904. The building, exclusive of the grounds, and including plumbing, heating, and electrical fitting, costs $380,064. The equipment is expected to cost about $30,000.

The James E. Yeatman Manual Training High School costs rather more, on account of the recent increase in the cost of building and labor. The contract figures are for $392,381, exclusive of the ground. The equipment will cost about the same as in the other school. This school will be ready for opening in September, 1904.

THE MCKINLEY HIGH SCHOOL.

Briefly described, the building will have a frontage of 255 feet on Russell avenue, by an extreme depth of 253 feet to



THE WILLIAM McKINLEY HIGH SCHOOL, ST. LOUIS, MO.

Allen avenue, and will set about 50 feet from the north line of the lot.

The main building will be three stories, with high well-lighted basement; the center portion of the main building being carried four stories for one additional room and architectural effect.

The shops are in one-story wings inclosing the two courts.

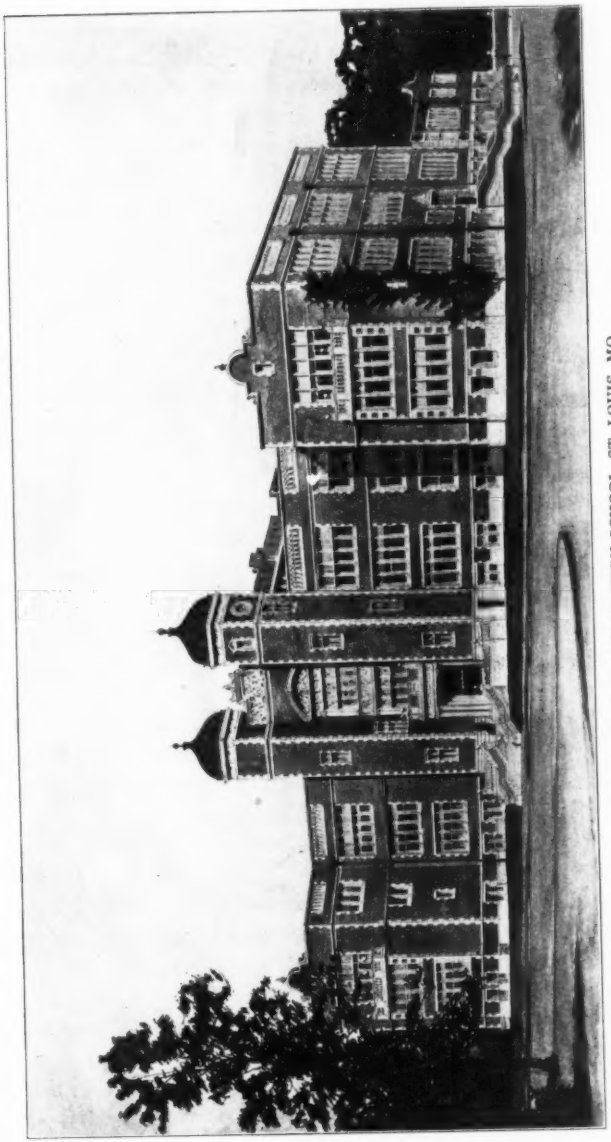
The auditorium is entered from the main corridor, and will seat 750 on the first floor. It has a large stage and two dressing-rooms.

The gallery of the auditorium is entered from the main corridor on the second floor, and will seat 200 pupils or more. Coat-rooms have been provided near the entrance of the auditorium, and in location, entrance, and appointments the auditorium is so arranged that it may be used for evening lectures and general-culture purposes.

There is one chemical laboratory and one physical laboratory, each equipped for a class of twenty-four pupils. To each of these two laboratories is attached a lecture-room, a teachers' laboratory, a store-room for apparatus, and a dark-room for photography. The lecture-rooms are arranged to accommodate about fifty pupils, and may be used independently of the laboratories for recitation purposes. The biological laboratory provides room for a class of twenty-four pupils, and has its teachers' laboratory, aquarium, and store-room.

To provide for the manual training of the girls, there are three rooms set aside for sewing and domestic science. Each of these rooms has its small store-room. Adjacent to one of these domestic-science rooms is a small model dining-room for instruction in serving meals.

There are also two woodworking shops on the first floor—one for carpentry work and one for wood-turning and pattern work. Each of these shops has its wash- and locker-room and tool-room. There is also for these two shops a stock-room where the material is prepared, and a storage-room capable of holding a year's supply of lumber. All supplies for the shops are brought in from the rear of the building, and distributed from these two stock-rooms. Each of these shops is equipped



THE JAMES E. YEATMAN HIGH SCHOOL, ST. LOUIS, MO.

for a class of twenty-four pupils; the maximum capacity of the woodworking shop, however, is thirty-six pupils.

Ascending to the second floor we find ten class-rooms, varying in size and capable of seating sections of twenty-four, forty-eight, and seventy-two pupils, respectively.

In a central location on the second floor a large room for a reference library has been provided with the necessary book-shelves for quite a large collection.

On the third floor may be found six additional class-rooms, in two sizes, capable of seating forty-eight and seventy-two pupils each; a large room 23 feet by 64 feet for free-hand drawing, arranged for sections of forty-eight; a business-room for sections of forty-eight, with the necessary banking-room, business offices, etc.; and a large room for shorthand and typewriting, capable of seating sections of twenty-four; also a room for photography with dark-room.

The central portion of the building is carried up to a fourth floor in the form of a tower, providing a mechanical drawing-room 72 feet by 32 feet, capable of taking sections of forty-eight pupils at one time. This room has its store-rooms and blue-printing room.

In the basement, close to the east and west entrances and properly separated, are the general locker-rooms for each sex. Small locker-rooms have been provided on each floor, as it was found best not to concentrate all lockers in one location. There are also in the basement the general toilet-rooms for girls and boys.

The boiler- and coal-rooms have been placed to the rear and outside of the main building. The space under the auditorium is taken up with the heating and ventilating apparatus, with the necessary electrical equipment for furnishing power for all the shops.

A small amphitheater, seating forty-eight pupils, has been arranged in this room so that the dynamos and engines may be used for illustration and study by classes.

The blacksmithing and machine shops have been placed in the courts. They are entered from the main corridor in the

basement by vestibules, thus preventing any noise penetrating the building. Each shop is 40 feet by 84 feet, and is equipped for sections of twenty-four each. Each has its store-room, tool-room, locker- and wash-room. There is also provided in the basement a large lunch-room and gymnasium. In connection with the gymnasium will be found lockers and shower baths for both boys and girls.

All parts of the building are perfectly lighted. Although the corridor space has been reduced to the minimum, a perfect circulation of classes is provided for.

I do not hesitate to say that visitors to the city during the year 1904 will find the McKinley High School one of the most interesting exhibits to be found in the city of the great fair. Its doors will be open to all visitors, and it is hoped that the city which gave birth to the first manual-training school twenty-four years ago will be found to have a manual-training high school second to none.

Conscious of the fact that many minds have been studying the problem of construction, and many people have had valuable experience in designing and using manual-training high schools, and wishing to get the best results of both study and experience, the board sent Superintendent F. L. Soldan and Building Commissioner W. B. Ittner on a tour of inspection throughout the country, to gather ideas and suggestions which should be embodied in these two new high schools. We think, therefore, that we have something worth seeing in these two new high schools.

As if by one consent, the attendance in all the higher grades of the grammar schools, and the number of those looking forward to the advantages of high-school education, are rapidly increasing.

The board is a unit in its desire to redeem St. Louis from its backward position in regard to school attendance in the higher grades, and it anticipates a rapid filling up of the two new schools as soon as they are opened. Undoubtedly there will soon be a demand for more; this demand the board will be able and happy to meet.

It is with unmixed pleasure that I am able to make this state-

ment, and to proclaim to the whole educational world that, however deficient St. Louis may be in many things, it is not lacking in its indorsement of public education and in its appreciation of the value of what the public schools have to offer throughout their entire course. The board is endeavoring to impress upon every parent the fact that his child is entitled to the entire course of the school; that there is no point short of graduation from the high school where a poor man can say that his child has had education enough, or all that he is entitled to.

Secondary education is rapidly approaching universality, and it will not be long before what is meant by a common-school education, which is the prerogative of every child, will include the four years of a high-school course. It is true that more education costs more money; but it is worth more money, and the community which sees that fact and furnishes the proper means is supremely fortunate.

CALVIN M. WOODWARD.

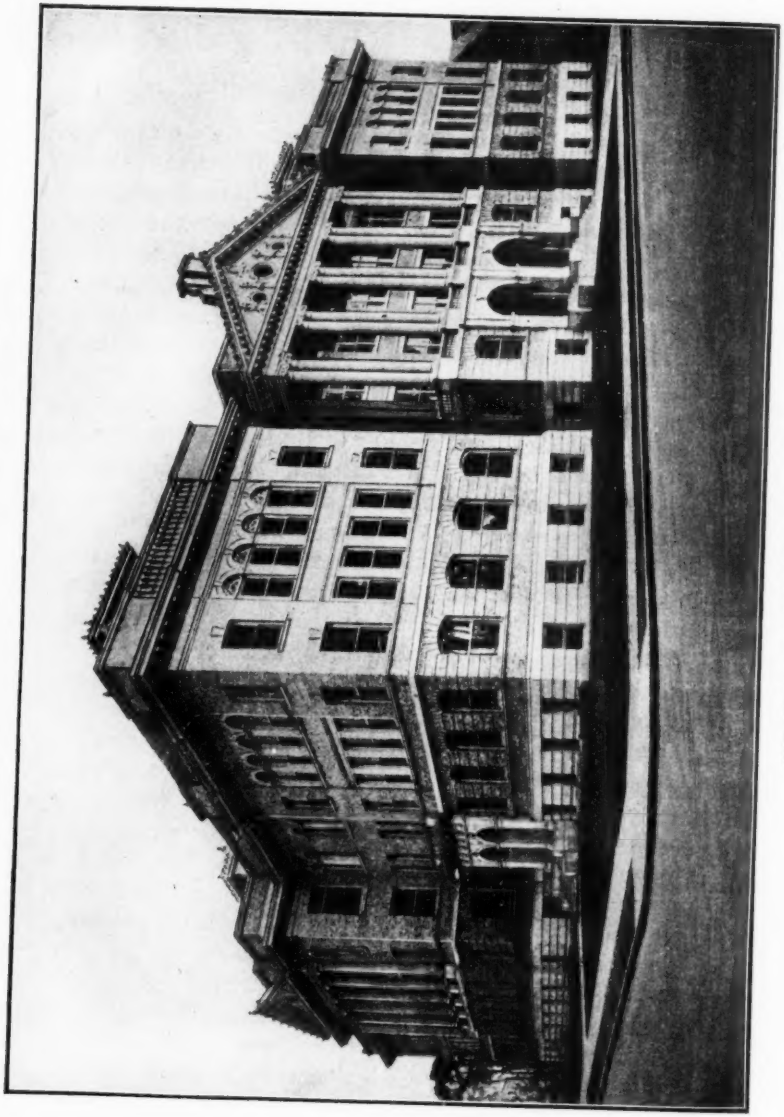
WASHINGTON UNIVERSITY.

THE NEW BUILDING OF THE SYRACUSE HIGH SCHOOL.

THE change from the old Syracuse High School building, outgrown, inconvenient, and altogether inadequate, to a brand-new building with modern arrangements and equipment for work, is so surprising and gratifying that I am at a loss to know how to express my sense of the greatness of that change. But while I can give only a dim notion of the inward satisfaction and inspiration of such a transition, I may be able to give in outline a few of the salient and material features of the new building.

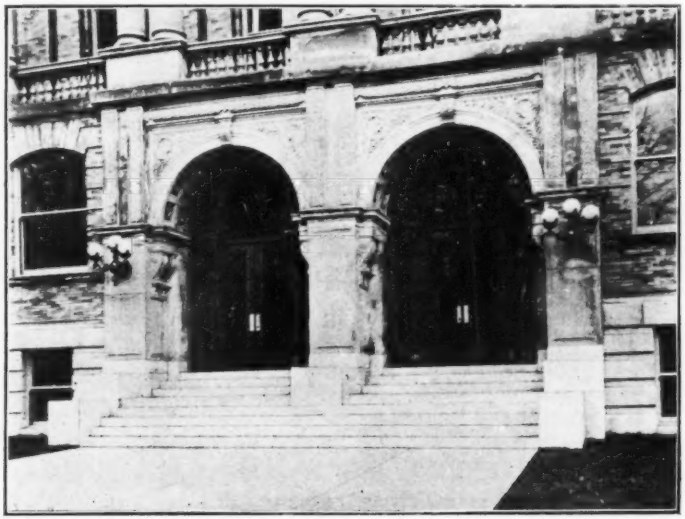
In the first place, it counts for much that the location of the building is so fine. It is quite away from "the madding crowd," and yet easy and convenient of access from every quarter of the city. It fronts on South Warren and South Salina streets, but between the two streets is a fine bit of green, called Billings Park. This little park keeps Salina street just far enough away to deaden the roar of the electric cars which run along that street from north to south of the city, yet leaves it near enough to land its young passengers, coming by single ticket or by transfer, within a half-minute walk of the entrance. The building fronts the west; on the north is East Adams street, with separate entrances for boys and girls to the main floor or basement; on the east is Linden street; on the south a driveway along which wheels are ridden to the basement doors.

The exterior is altogether noble in its proportions. Not highly ornate, it is still in most excellent taste, with an air of solidity and symmetry worthy of highest commendation. The slender-seeming yet strong and graceful columns take away from the front that appearance of "flatness" which mars so many fine and costly buildings. The pleasing effect of the front view is still further heightened by the fact that the building stands "in the open," as it were—with the width of two streets and a strip of park between it and the nearest houses to the west. A fair view of its outlines may be obtained from the accompanying cut.



THE PUBLIC HIGH SCHOOL, SYRACUSE, N. Y.

The front doors add so much to the general artistic appearance that I am tempted to show a picture of them, in the hope of making clear the large part which proper entrances play in the sum total of good architectural effect. Not only that, but large double doors, such as these and the doors on the north and south sides of the building, may be the means of saving precious lives in time of fire or panic.



But the real test of a good school building is not in the location or exterior so much as in the interior. A friend of mine was telling me this very morning of a fifty-thousand school building, fine in site and sight, but a downright failure in its internal arrangements. What a calamity to the community, and to the young student-life assembling there! With our building it is not so. The basement is as well adapted to certain purposes as the upper floors to other needs. In the basement, for instance, is the lunch-room—that indispensable adjunct of a single-session school. It is provided with a kitchen, a gas range, long counters, small tables, handy chairs, and stools. Students

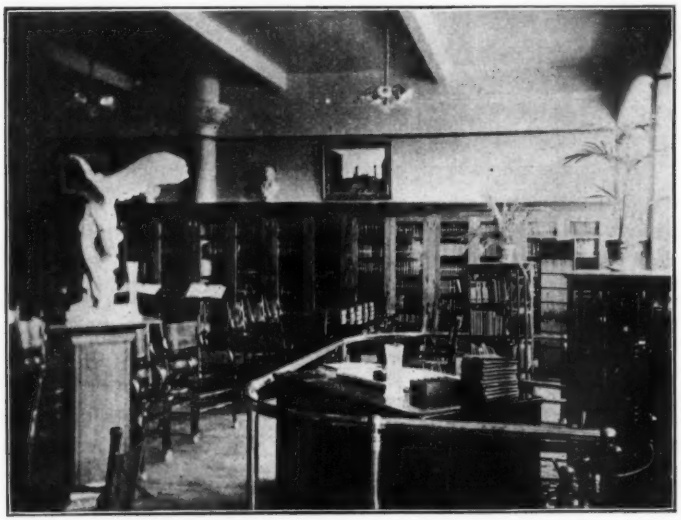
may bring or buy their lunch, may eat it down stairs or up, may wash it down with water, milk, hot chocolate, or coffee. And, all in all, a pleasanter sight it would be hard to find than hundreds of happy boys and girls enjoying their "twenty minutes for refreshments."

In the basement also are large storage rooms for bicycles. Into these rooms the high-school commission hesitated to put racks or "holders," thinking that the craze for wheel-riding might soon be over. But the first spring days brought in the wheels by hundreds. Next week the racks go in. It does seem too bad to use so much space simply for storage purposes; yet wheels are valuable property in themselves and in the saving of time and car fare, and must be well housed.

The toilet-rooms are models of convenience, and are, in addition, supplied with water, mirrors, towels, and things needful for comfort and cleanliness. I was in a new school building a short time ago where such quarters had been cramped and narrowed to make room for a tiny gymnasium. The wisdom of that may well be seriously doubted. And the lockers are well worth a minute's notice. They are all in the basement—about eight hundred of them; each one built to accommodate the coats, cloaks, hats, etc., of two students. Each student is supplied with a key, for whose safe use and return he makes a small deposit, handed back to him when he delivers up the key. A teacher friend and I had many discussions over the locker question, he arguing for the convenience of having them along the corridors and in small inset rooms on the various floors. But that plan would use up much valuable space and quite lessen the attractiveness and openness of the much-traveled highways of the building.

Leaving the humble but useful basement, we walk by stair treads, noticeably easy of grade, to the first floor. Just across the corridor, and occupying a part of the south side of the building, is a room useful and ornamental—useful for teachers' meetings, and sufficiently ornamental for strangers visiting the school. In the latter case we call it a "reception room." On the western front, next to the teachers' reception room, is the clerk's office—well lighted and supplied with a typewriter made in this

city, a large work-table, extensive cases, a safe, a most convenient and serviceable desk, and a telephone; the latter not for the use of students. Opening out from this room, and between it and the corridor, the women teachers have their lockers and toilet-room. Beyond the clerk's room to the west are three rooms: one for the transaction of the general business of the

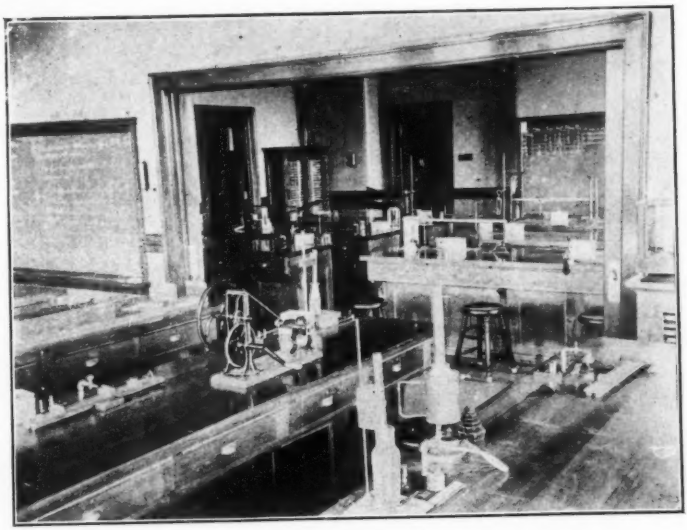


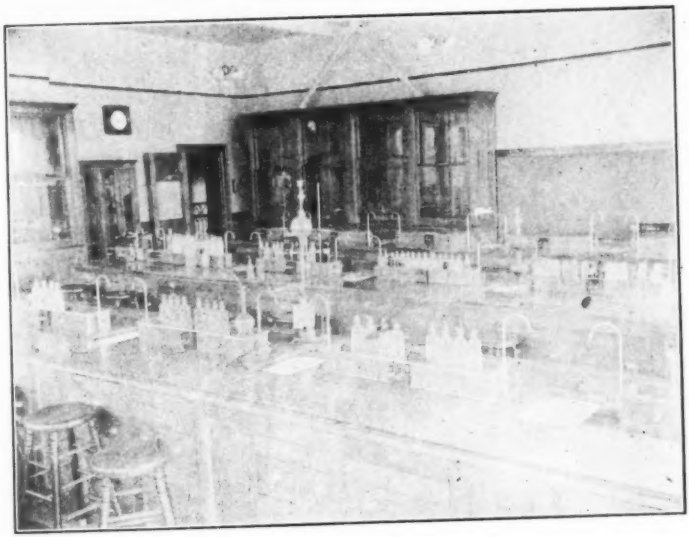
school; another, a waiting-room for students and patrons; the third room is the private office of the principal.

Passing out into the corridor on the first floor, we come upon the loggia, splendidly wrought in marble, set off by finely tinted walls. Here, fronting the visitor as he enters the building from the Warren street side, is a statue of Minerva, the gift of a graduate of the school. Beyond the loggia is a class-room, next a study-room, and across the corridor, on the north, two recitation rooms. This brings us to the library. But before we speak of that, it may be well to say a few words about these differing rooms. It is easy enough to say that a study-room should be used for study purposes only, a recitation room solely for recita-

tions, and that a class-room should combine permanent seats for students with usefulness for recitations; but in what proportion to blend the three is no easy matter to decide. To the writer the ideal plan seems to be to have a sufficient number of study- and class-rooms to give a desk to each student and yet so figure and plan that no student will recite in a study-room nor be present in a class-room unless actually in a recitation at the time. In other words, send to study-rooms all students when not busy with their recitation work. With us a careful estimate makes the proportion of reciters to those in study-rooms at any given period about as 60 per cent. to 40. The study and class rooms are arranged with desks of a special pattern and size. The recitation rooms are furnished with chairs instead of benches—a bad arrangement, so at first I feared. But no; the chairs, strong and equipped with "arms" or "rests," are not pushed about and in disorder, while the ease with which few or many can be used, and extra ones be removed or brought in, well fits the rooms to the size of individual classes. Let me add in passing that our rooms differ in size and, apart from any consideration of convenience, give a better effect than exact uniformity.

The library is on the first floor, just off from the north corridor. It has two entrances through alcove openings. The book-cases are of the best, and so indeed is all of the furniture, while the convenience of arrangement is very noticeable. The room that holds good books should certainly be made as attractive as possible, appealing to the eye and the sense of beauty. It should be large enough to hold the books of reading and of reference, with tables accommodating a goodly number of students, and with walls adorned with pictures and works of art. Here silence should reign, and every reader be made to feel that the time spent in such a place is sacred to the perusal of the best thoughts of the best minds, or at least to the gaining of such information as may be of service in a larger outlook and inlook upon worthy subjects of study. All these conditions and considerations have entered in no small degree into the daily life of this beautiful library room, a view of which accompanies this slight sketch.





Many there are in these modern days and this modern land who put the laboratory and its uses before the library and its usefulness. This comes about, undoubtedly, through the strength and influence of that commercial feeling which led Mr. Gladstone, years ago, to assert that commercial supremacy was fast passing "from us to our brethren across the sea." Be this as it may, it is nowadays a matter of greatest practical importance that every high-school building be equipped with the best laboratories that money and skill can furnish. In our building the chemical, physical, and biological laboratories are on the third, or top, floor. Up there light and air are fine; all noxious fumes go out and up, and the conditions for work are quite ideal. Connected with the physical department is a lecture-room, filled with rows of raised seats, a table for experimental purposes, and a lantern. Of course, this room may be used for lectures or talks on any subject connected with school work, and is useful in bringing together in one compact body the classes that in daily recitations are made up of several divisions. In the chemical laboratory — and indeed in the physical and biological as well — students take two periods of consecutive work — thus combining text-book instruction with actual experimentation in the attempt to "learn by doing." If the valuable space of this magazine or the interest of the reader would allow, an inventory might be given of the varied and complex apparatus needful for daily service in these workshops. But here it must suffice to say that, although the accompanying pictures give but a very imperfect notion of the range and equipment of these rooms, still enough has been said to intimate the importance of the scientific department in secondary work, and also the way in which the effort has been made in the Syracuse High School to meet the requirements of our time and land for instruction in science work.

On the same floor with the laboratories are the two large rooms set apart for drawing. Here the light is from the north. The work is very varied, suited in as far as possible to the immediate and prospective needs of each student. That is to say, the science student makes mechanical drawings, the history student is taught map-drawing, and the general student is trained in

BIOLOGICAL LABORATORY.

many forms of free-hand, original, copy, and water-color work. It may be said just here that there is a curious difference—I had almost said *in*difference—on the part of high schools with respect to the matter of drawing. I know of a modern-built school in a large city where one small room with about twenty-five "boards" is all the provision made for that work. With us, I am happy to say, its importance is fully recognized, and hundreds of students are taught the use of the hand, eye, and above all the imagination.

Thus far in this article I have tried to give an outline of the building itself and of the various "rooms" in which the young workmen study, recite, or recreate. A few words must suffice now for a note on the ventilating system—a system so elaborate that many pages would be needed fully to describe it, and a dictionary at hand to explain the technical expressions used. Perhaps the best thing to do is to quote from an article by S. Homer Woodbridge, of Boston, who had in charge the heating and ventilating of the new building:

> The entire system is such that the building can be warmed without being ventilated, and that it can be ventilated without being warmed, and that it can be warmed and ventilated either in whole or in part. That is, the two systems of heating and ventilating are entirely distinct and separate. The air can be supplied to one part of the building and excluded from the other by means of great dampers which are actuated by compressed-air mechanism, all of which are under the control of air-cocks located in the engineer's room.

To this well-put summary I need only add that the practical effects secured are fine. I never knew a large building so well heated, nor ventilation furnishing purer air.

More school buildings suffer from poor light than from any single cause. And I must confess that, as I followed the architect in the shaping of his plans, I felt great concern lest our building should be like the "shades of the prison-house, that close about the growing boy." But the completed work has disproved my fears. Every room in which students sit is an outer room, the corridors are wide and well lighted, and a great light-shaft between the large assembly room and the three north corridors sends its welcome beams to both.

But inasmuch as there are many "gray days" throughout the year in our city—days when little outer light can come in because there is little to come—a very complete system of electric lighting has been put in. It works well. To see the assembly hall lighted is an inspiration; and I believe that the same light that dispels the gloom of a dark day quickens the impulse and power of the student to work.

OFFICE OF THE DIRECTOR OF DRAWING.

Another great aid in our work is a telephone system which connects with every room in the building. From my office I can talk with any teacher at any time, or he with me; and the clerk may call for and receive back information concerning all details of absence, tardiness, reports, marks, and the like from the various study- and class-rooms. In the same breath with the telephones may be mentioned the automatic electric program clock, for the wires that connect with dials in each room (to announce the beginning and ending of each recitation period) are put into the same conduit with the telephone wires. I only add that when a program clock does its work constantly, accu-

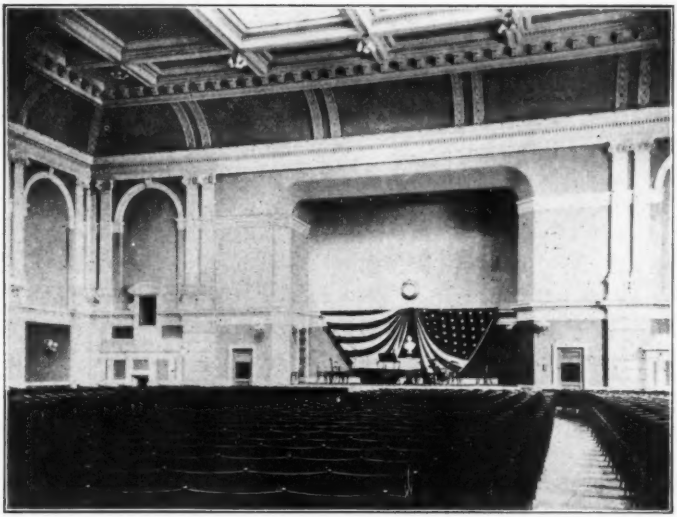
rately, unhitchingly, it is an unspeakable convenience; when it does not, but starts, halts, stops, it's—well, no matter. Ours does *not*, as yet.

The smallest, yet the most useful, room in the building is the emergency room, so called. To it are taken such teachers or students as are taken suddenly ill, and are in need of rest, quiet, or such restoratives as a well-furnished medicine-case can supply. In our old building, in an emergency case, we would have called for a bottle of ammonia from the chemist's room, and telephoned for a carriage, a doctor, and the mother.

It would not profit the reader to know about "the law's delays" and all the vicissitudes attending the legislation, beginning, progress, and completion of the new Syracuse High-School building. Nor would it be a safe guide for other cities to give the cost of the various parts that go to make up the sum total of expenditure for the building in this city. Take our case, for instance, as compared with that of Springfield, Mass. The money appropriated for our building was $400,000; for theirs, $400,000. Yet the capacity of theirs is about 800; of ours, 1,573.

Now I hasten to say, in closing, that it seems to me that the best justification of the existence and occupancy of the new building is found, not in the fact of the inadequacy of the old building, but in the hope of increased good to come to the cause of education and to the community at large. Edward Everett's academic statement is undoubtedly true: "Costly apparatus and splendid cabinets have no magical power to make scholars;" but good appointments certainly tend to bring and keep scholars under scholarlike influence. Thus our enrolment went up 225 at a bound, when the certainty of a change from old to new quarters was assured. And yet, again, it was a great gain and good to have a single session for all the school, instead of a hurried morning session for a part of the students and a dragging, tedious one till 4:30 P. M. for the rest. With this change, also, came recitation periods of adequate length, with five-minute breathing spells between, and a clear twenty minutes of intermission from study and books. With greater facilities for work

has come an enlarged and strengthened curriculum, embracing five distinct and separate courses, leading up to college, into professional schools, or out into life. It is greatly to the advantage of students to be able to get all the studies needful for entrance upon any of these three great spheres of educational activity. And toward this desirable preparation the new building itself is strongly contributing; for it is in a very great



LINCOLN HALL.

degree what may be termed a "workable" or "usable" building. How much this means to a good teacher only a teacher of that sort can tell. The better the workman, the better tools he must have; and even a poor teacher may find some impulse and profit in such a kit. Moreover, the students in the general assembly room get an acquaintance with each other such as they never had in the old building, where there was no such all-holding room. There is a help to patriotism in its very name, "Lincoln Hall," dedicated on the martyr's birthday with a magnificent oration by President Stryker of Hamilton College.

Indeed, from that day on the new building has been an inspirer. On February 23 a reunion of graduates was held. It proved to be the means of awakening pleasant memories of the old building and creating a fresh regard for the new. Through them the building has been adorned along the corridors and in the rooms with many pictures, busts, and casts. And their interest has been shared by the city at large. From many and diverse places, also, visitors have come in great numbers to see and "take notes." And thus it is that a thoroughly good school building is itself an educator. To this educator it has been my great pleasure to introduce the readers of the SCHOOL REVIEW.

W. K. WICKES.

PRINCIPAL'S OFFICE, PUBLIC HIGH SCHOOL,
Syracuse, N. Y.

A MODERN HIGH SCHOOL BUILDING.

A MODERN high-school building is an epitome of the educational progress that has taken place in this country within a generation. We of middle age recall the type of high-school house that prevailed when we attended school. It was a plain building with a large assembly-room in which the whole school was usually seated for study. Grouped about this room and opening from it were smaller rooms for recitation. These were furnished with plain settees, and blackboards occupied the wall space on the sides. A crude map or two, a globe, and a plain chair and table for the teacher, usually completed the equipment. As a rule, the building was heated with stoves, but hot-air furnaces were occasionally to be found in the best. Ventilation was supplied by opening windows, and at times pupils had fifty cubic feet of fresh air a minute at freezing temperature; at other times two or three, or perhaps none. There was little or no attention given to proper sanitation, and no provision was made for physical training.

The studies offered were chiefly linguistic and mathematical. The linguistic studies were those of the vernacular and the classics; the mathematics embraced higher arithmetic, a small amount of algebra, and a book or two of plane geometry. The courses were narrow and rigid. The sciences, modern languages, history, and the study of music and art had little, if any, recognition in the curriculum.

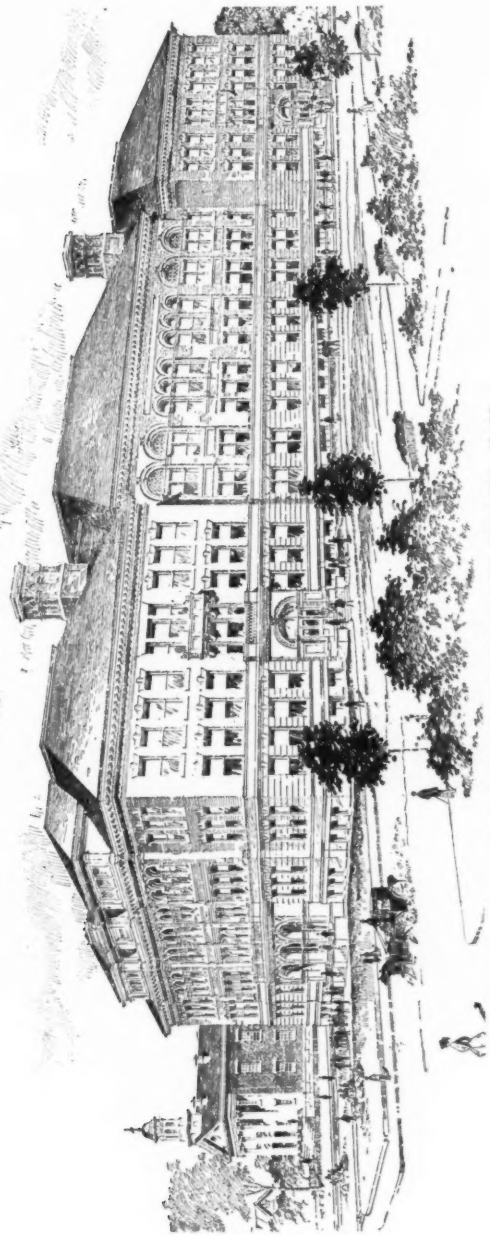
The idea of giving instruction in manual training and in the domestic arts in the schools had not been dreamed of by the most visionary of teachers. It is much less than twenty years ago when many of those who now are the strongest advocates of such instruction scouted the idea and opposed it with pen and speech on every occasion.

The number of high schools in the country a generation ago was small, and the attendance in those that existed was limited. Of those who entered, few boys especially remained to graduate,

unless they intended to enter college and prepare for one of the liberal professions. Herbert Spencer said of England, in 1861, that had there been no teaching but that given in the public schools she would now be what she was in the feudal times, and that all her industries would cease were it not for that information which men begin to acquire as they best may after their education is said to be finished. This criticism would have applied to the high schools and higher institutions of this country at that time, if not with equal force at least to a great degree.

But agencies were at work even then that were to revolutionize the processes of public education. The elementary schools first felt their influences, and the higher schools, though resisting them longer, were forced to yield. The old course of instruction, narrow in scope and rigid in its adherence to tradition, was foreign to the spirit of the American people. It failed to prepare the youth of the nation to enter its commercial and industrial life properly equipped to meet its requirements, and attracted to the higher schools but a small percentage of those who were looking forward to become merchants, manufacturers, engineers, and the like.

The rapid growth of the country and its wonderful industrial and commercial expansion, with its attendant increase in wealth, has multiplied the number of high schools in the country from hundreds to thousands; has brought into existence technical schools of various kinds; and has enabled the older universities to offer, besides their courses in the liberal arts, those which prepare directly for the practical pursuits of life. It is now incumbent upon high schools to offer courses that fit their pupils to enter these various courses now offered by the higher institutions. They must also provide courses varying in character for that large number of pupils who do not intend to enter higher institutions, or else they fail lamentably to meet the spirit of the times and the wants of the people. Moreover, the hygienic provisions made in the past for school buildings will not satisfy public demands of today. These, and other things upon which I shall not enter here, tend to increase the relative cost of a modern building over one of even twenty years ago.



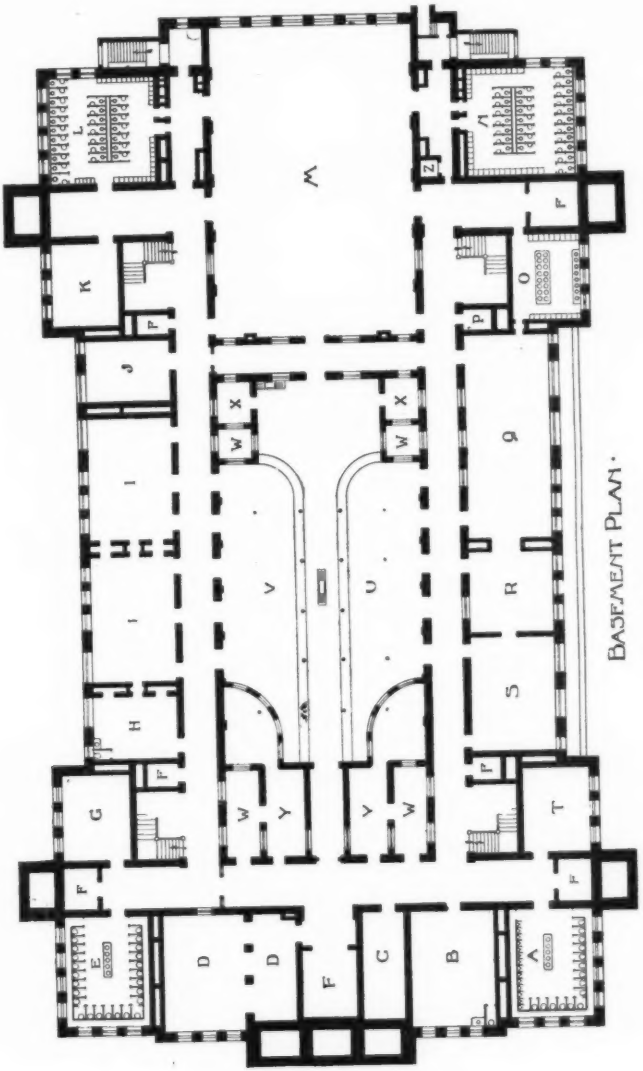
THE PUBLIC HIGH SCHOOL, NEW BEDFORD, MASS.

A building, to accommodate a thousand pupils today, must be much larger than one that would have been considered large enough for the same number of pupils in the past, and not only must it be larger, but it must be better.

Many taxpayers fail to appreciate the great changes that have taken place in educational affairs as well as they do those that have occurred in industrial life. They do not see the necessity for the erection of school buildings that are so much larger than was needed for the same number of pupils when they attended school; they look upon the provisions for the physical training of pupils and outlay for many of the hygienic improvements as sheer extravagance; they regard many of the new departures in education as fads and frills; they look upon the money expended for artistic adornment of the buildings as a scheme of the architect to increase his commissions, or one of the city officials to secure a rake-off.

Hence, there arises frequently an opposition that prevents in the erection of school buildings that wise and far-seeing policy that will insure for the schools those opportunities that will be of immeasurable value to the community. There can be no more productive expenditure of public money by the American people than that which gives its youth the fullest educational opportunities. And wise is that community which, following the example of the progressive manufacturer who relegates to the scrap-heap machinery that no longer can compete on equal terms with the more modern, keeps its educational machinery apace with the most enlightened thought of the age.

The city whose educational interests I have had the honor to direct for many years has a high-school building that was erected in 1874. It is an excellent type of the schoolhouse of that period. The building is 95 feet front, and the main body of the building 95 feet deep. The rear of the main building expands into two wings 8 feet wide by 35 feet deep, making the extreme width of the back of the building 111 feet. It contains seventeen rooms that can be used for class and recitation purposes, including a physical and a chemical laboratory, both situated in the basement; it contains an assembly hall that will



BASEMENT PLAN.

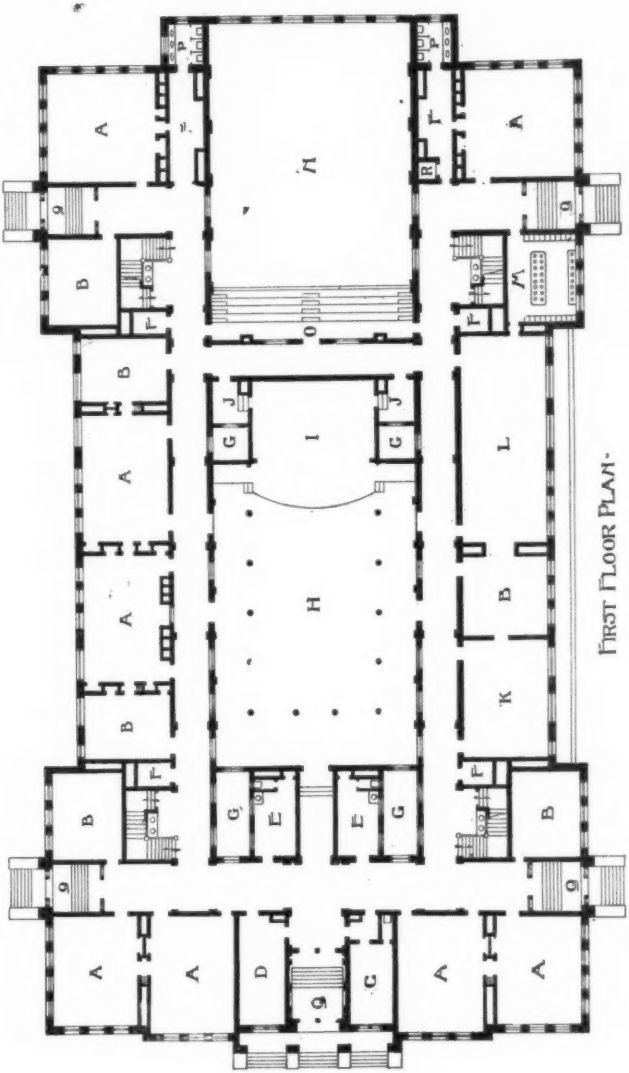
seat 600 persons, a principal's room, dressing-room for teachers, and clothes-rooms for the pupils. It is heated by steam and fairly well ventilated. With the narrow and rigid course of study that prevailed thirty years ago, it would accommodate five hundred pupils — the present number in attendance — without crowding. But with elective courses, the introduction of a commercial course, and the extension of the art and scientific studies, it is inadequate even with the assembly hall divided for class use. It has no provision for physical or manual training, no library, no lecture-rooms, and is wanting in other requirements of modern education. I present this brief description of this building to show the radical departure in our proposed building, which to many seems extravagant in its comprehensiveness and detail.

THE PROPOSED NEW HIGH-SCHOOL HOUSE, NEW BEDFORD, MASS.
(SAMUEL C. HUNT, NEW BEDFORD, ARCHITECT.)

The building, the plan of which is shown by the accompanying cuts, is to be 321 feet long by 175 feet wide, and will contain 51,286 square feet of floor space. It is to be three stories above the basement. The first story is to be of Indiana limestone, and the stories above a light buff brick with trimmings of the same stone as the first story. It is planned to provide for one thousand pupils.

BASEMENT.

A — Boys' toilet-room.
B — Janitor's room.
C — Boys' bicycle-room.
D — Boys' recreation-room.
E — Girls' toilet-room.
F — Store rooms.
G — Girls' examination room.
H — Janitress' room.
I — Girls' recreation room.
J — Girls' bicycle-room.
K — Girls' dressing-room.
L — Girls' locker and bath-room.
M — Gymnasium.
N — Boys' locker and bath-room.
O — Boys' locker and wash-room.
P — Motor and fan-room.
Q — Manual-training room.
R — Recitation room.
S — Spare room for manual training.
T — Boys' examination room.
U — Boys' lunch-room.
V — Girls' lunch room.
W — Light shafts.
X — Closets.
Y — Fan-room.
Z — Elevator.



FIRST FLOOR PLAN.

FIRST-FLOOR PLAN.

A — Class-rooms.
B — Recitation room.
C — Reception room.
D — Cloak-room.
E — Teachers' rooms.
F — Wardrobes.
G — Light shafts.
H — Assembly hall.
I — Stage.
J — Dressing-rooms.
K — Museum.
L — Manual training.
M — Locker and wash-room.
N — Gymnasium.
O — Gallery.
P — Toilet-rooms.
Q — Vestibules.
R — Elevator.

SECOND-FLOOR PLAN.

A — Class-rooms.
B — Recitation rooms.
C — Physical laboratories.
D — Secretary's room.
E — Library.
F — Head master's room.
G — Wardrobes.
H — Conservatory.
I — Teachers' rooms.
J — Light shafts.
K — Store-rooms.
L — Instructors' rooms.
M — Apparatus rooms.
N — Emergency room.
O — Lecture-room.
P — Manual training.
Q — Locker and wash-room.
R — Biological laboratories.
S — Toilet-rooms.
T — Galleries.
U — Upper part assembly hall.
V — Elevator.

THIRD-FLOOR PLAN.

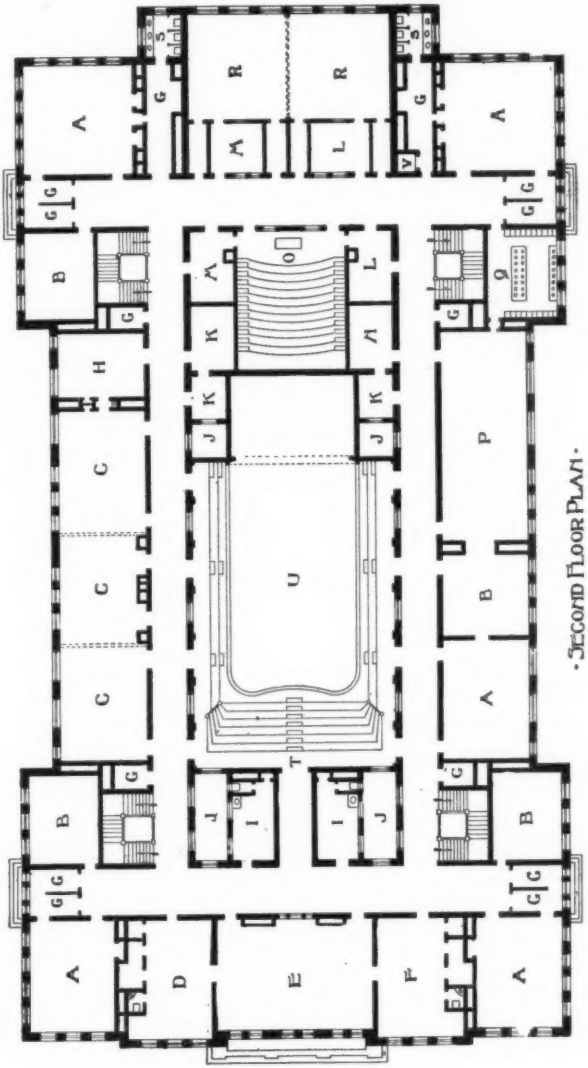
A — Class-rooms.
B — Recitation rooms.
C — Chemical laboratories.
D — Senior class-room.
E — Teachers' rooms.
F — Light shafts.
G — Wardrobes.
H — Drawing-room.
I — Manual training.
J — Locker and wash-room.
K — Toilet-rooms.
L — Sewing-room.
M — Kitchen.
O — Store-rooms.
P — Instructors' rooms.
Q — Model-room.
S — Upper part lecture-room.
T — Locker-room.
U — Elevator.
V — Roof over assembly hall.

A partial summary of the rooms in the building given below brings out some of its salient features:

1. A gymnasium and drill hall, 65 feet by 99 feet, two stories high, with running-track and galleries, dressing-rooms, and shower baths.

2. An assembly hall, with pitched floor, galleries on three sides, stage arrangement to seat between 250 and 300 pupils facing audience; capacity 1,500, exclusive of stage.

3. Manual-training group: 1 forge-room, 1 iron-working room, 1 wood-turning and pattern-making room, 1 sloyd- and general-carpentry room, 1 drafting-room.



SECOND FLOOR PLAN.

4. Domestic science and physiology group: 1 kitchen, 1 sewing- and dress-cutting room, 1 physiology room.

5. Science group: 1 triple laboratory with folding partitions, 26 by 150 feet, for physical science; 1 double laboratory with folding partitions, 26 by 70 feet for biology; 1 conservatory; 1 double laboratory with folding partitions, 26 by 70 feet for chemical science; 1 dark-room for photography; 1 lecture-room between physical and biological science groups, near center building, raised seats, capacity 125 to 150 pupils.

6. Commercial group: 2 bookkeeping, stenography, and banking rooms; 1 typewriting room.

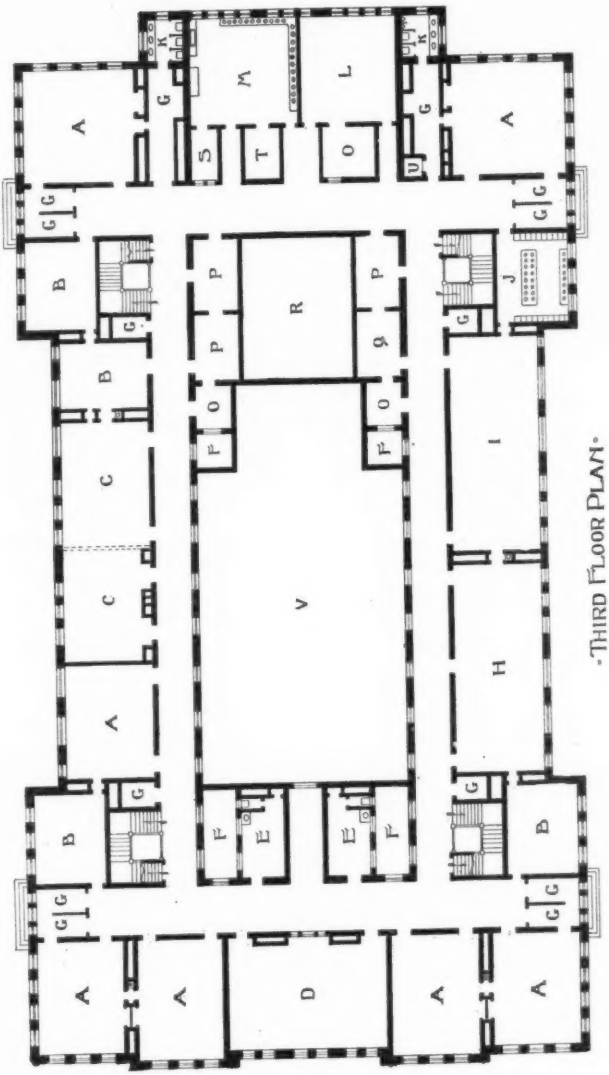
7. There are 17 class-rooms seating 48 pupils each, 12 recitation-rooms seating 25 pupils each, and 2 class-rooms seating 75 or 80 pupils each.

8. Some other special features are: a museum, an observatory, and a hospital room.

The building will contain sixty-eight rooms, exclusive of toilet-rooms, locker-rooms, and closets. The rooms and corridor floors and stair treads will be terraza, the stairways iron, and plate glass will be used for the windows.

The building, if constructed as planned (and it undoubtedly will be), if no modifications are made in the material first called for, will cost when equipped about $750,000 without the lot. The lowest bid of the contractors was $679,225. The contract has not yet been awarded.

The method adopted by the city council in preparing plans for this building is so unusual that it is worth presenting. Unfortunately in the erection of school buildings those who are to administer the school for which the building is designed have little or no voice in planning and equipping it. Not so in this case. When the city council authorized the erection of the building and the architect was chosen, an advisory committee, consisting of several members of the school committee, the superintendent of schools, the principal of the high school, and two other citizens not connected with any city body, was appointed to act with the committee of the city council in passing upon plans that should be submitted. This committee was allowed full vote in the selection and adoption of plans. The superintendent and principal were asked to submit the number and kind of rooms they desired, and their location, which they did. Ample means were given them for investigation in connection



THIRD FLOOR PLAN.

with the architect. He received and acted upon their suggestions in such a manner as to win their entire approval. The plans when prepared were duly considered by the whole committee, and, after many meetings and free discussion with the architect, adopted as they stand.

The ideas that dominated from the first in the creation of the plan adopted have been utility, comprehensiveness, and administrative economy. Its projectors are firm believers that it is educationally sound to have all departments — classical, scientific, commercial, and mechanic arts — under one administrative roof, whenever possible. They have tried to group all related departments in the building, that they may be administered with the least loss of time and energy to both teachers and pupils; and they feel that they have been moderately successful.

The cost may seem excessive for a building to accommodate only one thousand pupils and for a city of 70,000 inhabitants, though it is growing. But the eight-hour working day which prevails here now, and the high cost of material at the present time, add some 33 per cent. to what the cost of the building would have been a few years ago.

It is intended to make this building an educational center for the whole city. With that idea the assembly hall was placed on the ground floor, with theater plan, and the construction made large enough to accommodate a popular audience.

Wm. E. Hatch.

Superintendent's Office.
New Bedford, Mass.

ON THE FOUNDATIONS OF MATHEMATICS.[1]

THE American Mathematical Society gives its retiring president the privilege of speaking on whatever he may have at heart. Accordingly, this afternoon I propose to consider with you some matters of importance — indeed, perhaps of fundamental importance — in the development of mathematics in this country; and it will duly appear in what non-technical sense I am speaking "On the Foundations of Mathematics."

A VIEW.

Abstract mathematics.— The notion within a given domain of defining the objects of consideration rather by a body of properties than by particular expressions or intuitions is as old as mathematics itself. And yet the central importance of the notion appeared only during the last century — in a host of researches on special theories and on the foundations of geometry and analysis. Thus has arisen the general point of view of what may be called *abstract mathematics*. One comes in touch with the literature very conveniently by the mediation of Peano's *Revue des mathématiques*. The Italian school of Peano and the *Formulaire mathématique*, published in connection with the *Revue*, are devoted to the codification in Peano's symbolic language of the principal mathematical theories, and to researches on abstract mathematics. General interest in abstract mathematics was aroused by Hilbert's Gauss-Weber *Festschrift* of 1899, *Ueber die Grundlagen der Geometrie*, a memoir rich in results and suggestive in methods. I refer to the reviews by Sommer,[2] Poincaré,[3] Halsted,[4] Hedrick,[5] and Veblen.[6]

We have as a basal science logic, and as depending upon it the special deductive sciences which involve undefined symbols and whose propositions are not all capable of proof. The symbols denote either classes of elements or relations among elements. In any such science one may choose in various ways the system of undefined symbols and the system of undemonstrated or primitive propositions, or postulates. Every proposition follows from the postulates by a finite number of logical steps. A careful statement of the fundamental generalities is given by Padoa in a paper[7] before the Paris Congress of Philosophy, 1900.

[1] Presidential address delivered before the American Mathematical Society at its ninth annual meeting, December 29, 1902.

[2] *Bull. Amer. Math. Soc.* (2), Vol. VI (1900), p. 287.

[3] *Bull. sciences mathém.*, Vol. XXVI (1902), p. 249.

[4] *Open Court*, September, 1902.

[5] *Bull. Amer. Math. Soc.* (2), Vol. IX (1902), p. 158. [6] *Monist*, January, 1903.

[7] "Essai d'une théorie algébrique des nombres entiers, précédé d'une Introduction logique à une théorie déductive quelconque," *Bibliothèque du Congrès international de Philosophie*, Vol. III, p. 309.

Having in mind a definite system of undefined symbols and a definite system of postulates, we have first of all the notion of the compatibility of these postulates; that is, that it is impossible to prove by a finite number of logical steps the simultaneous validity of a statement and its contradictory statement. In the next place, the question of the independence of the postulates or the irreducibility of the system of postulates; that is, that no postulate is provable from the remaining postulates. Padoa introduces the notion of the irreducibility of the system of undefined symbols. A system of undefined symbols is said to be reducible if for one of the symbols, X, it is possible to establish, as a logical consequence of the assumption of the validity of the postulates, a nominal or symbolic definition of the form $X = A$, where in the expression A there enter only the undefined symbols distinct from X. For the purpose of practical application, it seems to be desirable to modify the definition so as to call the system of undefined symbols, reducible if there is a nominal definition $X = A$ of one of them, X in terms of the others, such that in any interpretation of the science the postulates retain their validity, when instead of the initial interpretation of the symbol X there is placed the interpretation A of that symbol. If the system of symbols is reducible in the sense of the original definition it is in the sense of the new definition, but not necessarily conversely, as appears for instance from the following example, occurring in the foundations of geometry.

Hilbert uses the following undefined symbols: "point," "line," "plane," "incidence" of point and line, "incidence" of point and plane, "between," and "congruent." Now, it is possible to give for the symbol "plane" a symbolic definition in terms of the other undefined symbols — for instance, a plane is a certain class of points (as Peano showed in 1892); or, again, a plane is a certain class of lines; while the notion "incidence" of point and plane receives convenient definition. It is apparent from the fact that these definitions may be given in these two ways that Hilbert's system of undefined symbols is not in Padoa's sense irreducible, at least in so far as the symbols "plane," "incidence" of point and plane are concerned; while it is equally clear that these symbols are in the abstract geometry superfluous.

In his dissertation on Euclidean geometry, Mr. Veblen, following the example of Pasch and Peano, takes as undefined symbols "point" and "between," or "point" and "segment." In terms of these two symbols alone he expresses a set of independent fundamental postulates of Euclidean geometry, in the first place developing the projective geometry, and then as to congruence relating himself to the point of view of Klein in his *Erlangen Programm*, whereby the group of movements of Euclidean geometry enters as a certain subgroup of the group of collineations of projective geometry. Here arises an interesting question as to the sense in which the undefined symbol "congruence" is superfluous in the Euclidean geometry based upon the symbols "point," "between." One sees at once that a definition of "congruence" involves parametric points in its expression, while on the other

hand a definition of the system of all "planes," that is, of the general concept "plane," involves no such parametric elements. But, again, just as there exist distinct definitions of "congruence," owing to a variation of the parametric points, so there exist distinct definitions of the general concept "plane," as was indicated a moment ago. One has the feeling that the state of affairs must be as follows: In any interpretation of, say, Hilbert's symbols, wherein the postulates of Hilbert are valid, every valid statement which does not involve the symbol "plane" in direct connection with the general logical symbol (=) of symbolic definition remains valid when we modify it in accordance with either of the definitions of "plane" previously referred to. On the other hand, this state of affairs does not hold for the symbol "congruence." The proof of the former statement would seem to involve fundamental logical niceties.

The compatibility and the independence of the postulates of a system of postulates of a special deductive science have been up to this time always made to depend upon the self-consistency of some other deductive science; for instance, geometry depends thus upon analysis, or analysis upon geometry. The fundamental and still unsolved problem in this direction is that of the direct proof of the compatibility of the postulates of arithmetic, or of the real number system of analysis. (To the society this morning Dr. Huntington exhibited two sets of independent postulates for this real number system.) This is the second of the twenty-three problems listed by Hilbert in his address before the Paris Mathematical Congress of 1900.

The Italian writers on abstract mathematics for the most part make use of Peano's symbolism. One may be tempted to feel that this symbolism is not an essential part of their work. It is only right to state, however, that the symbolism is not difficult to learn, and that there is testimony to the effect that the symbolism is actually of great value to the investigator in removing from attention the concrete connotations of the ordinary terms of general and mathematical language. But of course the essential difficulties are not to be obviated by the use of any symbolism, however delicate.

Indeed, the question arises whether the abstract mathematicians in making precise the metes and bounds of logic and the special deductive sciences are not losing sight of the evolutionary character of all life-processes, whether in the individual or in the race. Certainly the logicians do not consider their science as something now fixed. All science, logic and mathematics included, is a function of the epoch—all science in its ideals as well as in its achievements. Thus with Hilbert let a special deductive or mathematical science be based upon a finite number of symbols related by a finite number of compatible postulates, every proposition of the science being deducible by a finite number of logical steps from the postulates. The content of this conception is far from absolute. It involves what presuppositions as to general logic? What is a finite number? In what sense is a postulate—for example, that any two distinct points determine a line—a single postulate? What are the

permissible logical steps of deduction? Would the usual syllogistic steps of formal logic suffice? Would they suffice even with the aid of the principle of mathematical induction, in which Poincaré finds[1] the essential synthetic element of mathematical argumentation the basis of that generality without which there would be no science? In what sense is mathematical induction a single logical step of deduction?

One has, then, the feeling that the carrying out in an absolute sense of the program of the abstract mathematicians will be found impossible. At the same time, one recognizes the importance attaching to the effort to do precisely this thing. The requirement of rigor tends toward essential simplicity of procedure, as Hilbert has insisted in his Paris address, and the remark applies to this question of mathematical logic and its abstract expression.

Pure and applied mathematics.—In the ultimate analysis for any epoch, we have general logic, the mathematical sciences,[2] that is, all special formally and abstractly deductive self-consistent sciences, and the natural sciences, which are inductive and informally deductive. While this classification may be satisfactory as an ideal one, it fails to recognize the fact that in mathematical research one by no means confines himself to processes which are mathematical according to this definition; and if this is true with respect to the research of professional mathematicians, how much more is it true with respect to the study, which should throughout be conducted in the spirit of research, on the part of students of mathematics in the elementary schools and colleges and universities? I refer to the articles[3] of Poincaré on the rôle of intuition and logic in mathematical research and education.

It is apparent that this ideal classification can be made by the devotee of science only when he has reached a considerable degree of scientific maturity, that perhaps it would fail to appeal to non-mathematical experts, and that it does not accord with the definitions given by practical working mathematicians. Indeed, the attitude of practical mathematicians toward this whole subject of abstract mathematics, and especially the symbolic form of abstract mathematics, is not unlike that of the practical physicist toward the whole subject of theoretic mathematics, and in turn not unlike that of the practical engineer toward the whole subject of theoretical physics and mathematics. Furthermore, everyone understands that many of the most important

[1] "Sur la nature du raisonnement mathématique," *Revue de métaphysique et de morale*, Vol. II (1894), pp. 371–84.

[2] Of which none is at present known to exist.

[3] "La logique et l'intuition dans la science mathématique et dans l'enseignement," *L'Enseignement mathématique*, Vol. I (1899), pp. 157–62. "Du rôle de l'intuition et de la logique en mathématiques," *Compte rendu du Deuxième Congrès international des Mathématiciens*, Paris (1900), 1902, pp. 115–30. "Sur les rapports de l'analyse pure et de la physique mathématique," Conference, Zurich, 1897; *Acta Mathematica*, Vol. XXI, p. 238.

advances of pure mathematics have arisen in connection with investigations originating in the domain of natural phenomena.

Practically, then, it would seem desirable for the interests of science in general that there should be a strong body of men thoroughly possessed of the scientific method in both its inductive and its deductive forms. We are confronted with the questions: What is science? What is the scientific method? What are the relations between the mathematical and the natural scientific processes of thought? As to these questions, I refer to articles and addresses of Poincaré,[1] Boltzmann,[2] and Burkhardt,[3] and to Mach's *Science of Mechanics* and Pearson's *Grammar of Science*.

Without elaboration of metaphysical or psychological details, it is sufficient to refer to the thought that the individual, as confronted with the world of phenomena in his effort to obtain control over this world, is gradually forced to appreciate a knowledge of the usual coexistences and sequences of phenomena, and that science arises as the body of formulas serving to epitomize or summarize conveniently these usual coexistences and sequences. These formulas are of the nature of more or less exact descriptions of phenomena; they are not of the nature of explanations. Of all the relations entering into the formulas of science, the fundamental mathematical notions of number and measure and form were among the earliest, and pure mathematics in its ordinary acceptation may be understood to be the systematic development of the properties of these notions, in accordance with conditions prescribed by physical phenomena. Arithmetic and geometry, closely united in mensuration and trigonometry, early reached a high degree of advancement. But after the development of the generalizing literal notations of algebra, and largely in response to the insistent demands of mechanics, astronomy, and physics, the seventeenth century, binding together arithmetic and geometry infinitely more closely, created analytic geometry and the infinitesimal calculus, those mighty methods of research whose application to all branches of the theoretical and practical physical sciences so fundamentally characterizes the civilization of today.

The eighteenth century was devoted to the development of the powers of these new instruments in all directions. While this development continued during the nineteenth century, the dominant note of the nineteenth century was that of critical reorganization of the foundations of pure mathematics, so that, for instance, the majestic edifice of analysis was seen to rest upon the

[1] In addition to those already cited: "On the Foundations of Geometry," *Monist*, Vol. IX (October, 1898), pp. 1–43; "Sur les principes de la mécanique," *Bibliothèque du Congrès international de Philosophie*, Vol. III, pp. 457–94.

[2] "Ueber die Methoden der theoretischen Physik," *Dyck's Katalog mathematischer und mathematisch-physikalischer Modelle, Apparate und Instrumente*, pp. 89–98 (Munich, 1892).

[3] "Mathematisches und naturwissenschaftliches Denken," *Jahresbericht der Deutschen Math.-Ver.*, Vol. XI (1902), pp. 49–57.

arithmetic of positive integers alone. This reorganization and the consequent course of development of pure mathematics were independent of the question of the application of mathematics to the sister-sciences. There has thus arisen a chasm between pure mathematics and applied mathematics. There have not been lacking, however, influences making toward the bridging of this chasm; one thinks especially of the whole influence of Klein in Germany and of the École Polytechnique in France. As a basis of union of the pure mathematicians and the applied mathematicians, Klein has throughout emphasized the importance of a clear understanding of the relations between those two parts of mathematics which are conveniently called "mathematics of precision" and "mathematics of approximation," and I refer especially to his latest work of this character, *Anwendung der Differential- und Integral-Rechnung auf Geometrie: Eine Revision der Principien* (Göttingen, summer semester, 1901; Teubner, 1902). This course of lectures is designed to present particular applications of the general notions of Klein, and, furthermore, it is in continuation of the discussion between Pringsheim and Klein and others, as to the desirable character of lectures on mathematics in the universities of Germany.

Elementary mathematics.—This separation between pure mathematics and applied mathematics is grievous even in the domain of elementary mathematics. In witness, in the first place: The workers in physics, chemistry, and engineering need more practical mathematics; and numerous text-books, in particular on calculus, have recently been written from the point of view of these allied subjects. I refer to the works by Nernst and Schoenflies,[1] Lorentz,[2] Perry,[3] and Mellor,[4] and to a book on the very elements of mathematics, now in preparation by Oliver Lodge.

In the second place, I dare say you are all familiar with the surprisingly vigorous and effective agitation with respect to the teaching of elementary mathematics which is at present in progress in England, largely under the direction of John Perry, professor of mechanics and mathematics of the Royal College of Science, London, and chairman of the board of examiners of the board of education in the subjects of engineering, including practical plane and solid geometry, applied mechanics, practical mathematics, in addition to more technical subjects, and in this capacity in charge of the education of some hundred thousand apprentices in English night schools. The section on education of the British Association had its first session at the Glasgow

[1] NERNST UND SCHOENFLIES, *Einführung in die mathematische Behandlung der Naturwissenschaften* (Munich and Leipzig, 1895); the basis of YOUNG AND LINEBARGER'S *Elements of Differential and Integral Calculus;* New York, 1900.

[2] LORENTZ, *Lehrbuch der Differential- und Integralrechnung;* Leipzig, 1900.

[3] PERRY, *Calculus for Engineers* (second edition; London: E. Arnold, 1897); German translation by FRICKE (Teubner, 1902). *Cf.* also the citations given later on.

[4] MELLOR, *Higher Mathematics for Students of Chemistry and Physics, with Special Reference to Practical Work;* Longmans, Green & Co., 1902, pp. xxi + 543.

meeting, 1901, and the session was devoted to the consideration, in connection with the section on mathematics and physics, of the question of the pedagogy of mathematics, and Perry opened the discussion by a paper on "The Teaching of Mathematics." A strong committee, under the chairmanship of Professor Forsyth, of Cambridge, was appointed "to report upon improvements that might be effected in the teaching of mathematics, in the first instance, in the teaching of elementary mathematics, and upon such means as they think likely to effect such improvements." The paper of Perry, with the discussion of the subject at Glasgow, and additions including the report of the committee as presented to the British Association at its Belfast meeting, September 1902, are collected in a small volume, *Discussion on the Teaching of Mathematics*, edited by Professor Perry (Macmillan, second edition, 1902).[1]

One should consult the books of Perry, *Practical Mathematics*,[2] *Applied Mechanics*,[3] *Calculus for Engineers*,[4] and *England's Neglect of Science*,[5] and his address[6] on "The Education of Engineers"—and furthermore the files from 1899 on of the English journals *Nature*, *School World*, *Journal of Education*, and *Mathematical Gazette*.

One important purpose of the English agitation is to relieve the English secondary-school teachers from the burden of a too precise examination system, imposed by the great examining bodies; in particular, to relieve them from the need of retaining Euclid as the sole authority in geometry, at any rate with respect to the sequence of propositions. Similar efforts made in England about thirty years ago were unsuccessful. Apparently the forces operating since that time have just now broken forth into successful activity; for the report of the British Association committee was distinctly favorable, in a conservative sense, to the idea of reform, and already noteworthy initial changes have been made in the regulations for the secondary examinations by the examination syndicates of the Universities of Oxford, Cambridge, and London.

The reader will find the literature of this English movement very interesting and suggestive. For instance, in a letter to *Nature* (Vol. LCV, p. 484, March 27, 1902) Perry mildly apologizes for having to do with the movement whose immediate results are likely to be merely slight reforms, instead of

[1] *Cf.* also *Report on the Teaching of Elementary Mathematics issued by the Mathematical Association*. London: G. Bell & Sons, 1902.

[2] Published for the Board of Education by Eyre & Spottiswoode, London, 1899.

[3] New York: D. Van Nostrand Co., 1898.

[4] Second edition; London: E. Arnold, 1897.

[5] London: T. Fisher Unwin, 1900.

[6] In opening the discussion of the sections on Engineering and on Education at the Belfast, 1902, meeting of the British Association; published in *Science*, November 14, 1902.

thoroughgoing reforms called for in his pronouncements and justified by his marked success during over twenty years as a teacher of practical mathematics. He asserts that the orthodox logical sequence in mathematics is not the only possible one; that, on the contrary, a more logical sequence than the orthodox one (because one more possible of comprehension by students) is based upon the notions underlying the infinitesimal calculus taken as axioms; for instance, that a map may be drawn to scale; the notions underlying the many uses of squared paper; that decimals may be dealt with as ordinary numbers. He asserts as essential that the boy should be *familiar* (by way of experiment, illustration, measurement, and by every possible means) with the ideas to which he applies his logic; and, moreover, that he should be thoroughly *interested* in the subject studied; and he closes with this peroration:

> "Great God! I'd rather be
> A pagan, suckled in a creed outworn."

I would rather be utterly ignorant of all the wonderful literature and science of the last twenty-four centuries, even of the wonderful achievements of the last fifty years, than not to have the sense that our whole system of so-called education is as degrading to literature and philosophy as it is to English boys and men.

As a pure mathematician, I hold as the most important suggestion of the English movement the suggestion of Perry's just cited, that by emphasizing steadily the practical sides of mathematics, that is, arithmetic computations, mechanical drawing, and graphical methods generally, in continuous relation with problems of physics and chemistry and engineering, it would be possible to give very young students a great body of the essential notions of trigonometry, analytic geometry, and the calculus. This is accomplished, on the one hand, by the increase of attention and comprehension obtained by connecting the abstract mathematics with subjects which are naturally of interest to the boy, so that, for instance, all the results obtained by theoretic process are capable of check by laboratory process, and, on the other hand, by a diminution of emphasis on the systematic and formal sides of the instruction in mathematics. Undoubtedly many mathematicians will feel that this decrease of emphasis will result in much, if not irreparable, injury to the interests of mathematics. But I am inclined to think that the mathematician with the catholic attitude of an adherent of science in general (and at any rate with respect to the problems of the pedagogy of elementary mathematics there would seem to be no other rational attitude) will see that the boy will be learning to make practical use in his scientific investigations — to be sure, in a naïve and elementary way — of the finest mathematical tools which the centuries have forged; that under skilful guidance he will learn to be interested, not merely in the achievements of the tools, but in the theory of the tools themselves and that thus he will ultimately have a feeling toward his mathematics extremely different from that which is now met with only too frequently — a feeling that mathematics is indeed itself a fundamental reality

of the domain of thought, and not merely a matter of symbols and arbitrary rules and conventions.

The American Mathematical Society.— The American Mathematical Society has, naturally, interested itself chiefly in promoting the interests of research in mathematics. It has, however, recognized that those interests are closely bound up with the interests of education in mathematics. I refer in particular to the valuable work done by the committee appointed, with the authorization of the Council, by the Chicago section of the society, to represent mathematics in connection with Dr. Nightingale's committee of 1899 of the National Educational Association in the formulation of standard curricula for high schools and academies, and to the fact that two committees are now at work, one appointed in December, 1901, by the Chicago section, to formulate the desirable conditions for the granting by institutions of the Mississippi valley of the degree of master of arts for work in mathematics, and the other appointed by the society at its last summer meeting to co-operate with similar committees of the National Educational Association and of the Society for the Promotion of Engineering Education, in formulating standard definitions of requirements in mathematical subjects for admission to colleges and technological schools; and furthermore I refer to the fact that (although not formally) the society has made a valuable contribution to the interests of secondary education in that the College Entrance-Examination Board has as its secretary the principal founder of the society. I have accordingly felt at liberty to bring to the attention of the society these matters of the pedagogy of elementary mathematics, and I do so with the firm conviction that it would be possible for the society, by giving still more attention to these matters, to further most effectively the highest interests of mathematics in this country.

A VISION.

An invitation.— The pure mathematicians are invited to determine how mathematics is regarded by the world at large, including their colleagues of other science departments and the students of elementary mathematics, and to ask themselves whether, by modification of method and attitude, they may not win for it the very high position in general esteem and appreciative interest which it assuredly deserves.

This general invitation and the preceding summary view invoke this vision of the future of elementary mathematics in this country.

The pedagogy of elementary mathematics.— We survey the pedagogy of elementary mathematics in the primary schools, in the secondary schools, and in the junior colleges (the lower collegiate years). It is, however, understood that there is a movement for the enlargement of the strong secondary schools, by the addition of the two years of junior college work and by the absorption of the last two or three grades of the primary schools, into institutions more

of the type of the German *Gymnasia* and the French *lyceé*;[1] in favor of this movement there are strong arguments, and among them this, that in such institutions, especially if closely related to strong colleges or universities, the mathematical reforms may the more easily be carried out.

The fundamental problem is that of *the unification of pure and applied mathematics*. If we recognize the branching implied by the very terms "pure," "applied," we have to do with a special case of *the correlation of different subjects* of the curriculum, a central problem in the domain of pedagogy from the time of Herbart on. In this case, however, the fundamental solution is to be found rather by way of indirection — by arranging the curriculum so that throughout the domain of elementary mathematics the branching be not recognized.

The primary schools.—Would it not be possible for the children in the grades to be trained in power of observation and experiment and reflection and deduction so that always their mathematics should be directly connected with matters of thoroughly concrete character? The response is immediate that this is being done today in the kindergartens and in the better elementary schools. I understand that serious difficulties arise with children of from nine to twelve years of age, who are no longer contented with the simple, concrete methods of earlier years and who, nevertheless, are unable to appreciate the more abstract methods of the later years. These difficulties, some say, are to be met by allowing the mathematics to enter only implicitly in connection with the other subjects of the curriculum. But rather the material and methods of the mathematics should be enriched and vitalized. In particular the grade teachers must make wiser use of the foundations furnished by the kindergarten. The drawing and the paper-folding must lead on directly to systematic study of intuitional geometry, including the construction of models and the elements of mechanical drawing, with simple exercises in geometrical reasoning.[2] The geometry must be closely connected with the numerical and literal arithmetic. The cross-grooved tables of the kindergarten furnish an especially important type of connection, viz., a conventional graphical depiction of any phenomenon in which one magnitude depends upon another. These tables, and the similar cross-section blackboards and paper, must enter largely into all the mathematics of the grades. The children are to be taught to represent, according to the usual conventions, various familiar and interesting phenomena, and to study the

[1] As to the mathematics of these institutions, one may consult the book on *The Teaching of Mathematics in the Higher Schools of Prussia* (New York: Longmans, Green & Co., 1900) by PROF. J. W. A. YOUNG, and the article (*Bulletin Amer. Math. Soc.* [2] Vol. VI, p. 225) by PROFESSOR PIERPONT.

[2] Here I refer to the very suggestive paper of BENCHARA BRANFORD, entitled "Measurement and Simple Surveying: An Experiment in the Teaching of Elementary Geometry" to a small class of beginners of about ten years of age (*Journal of Education*, London, the first part appearing in the number for August, 1899).

properties of the phenomena in the pictures; to know, for example, what concrete meaning attaches to the fact that a graph curve at a certain point is going down or going up or is horizontal. Thus the problems of percentage, interest, etc., have their depiction in straight-line or broken-line graphs.

The secondary schools.— Pending the reform of the primary schools, the secondary schools must advance independently. In these schools at present, according to one type of arrangement, we find algebra in the first year, plane geometry in the second, physics in the third, and the more difficult parts of algebra and solid geometry, with review of all the mathematics, in the fourth.

Engineers[1] tell us that in the schools algebra is taught in one water-tight compartment, geometry in another, and physics in another, and that the student learns to appreciate (if ever) only very late the absolutely close connection between these different subjects, and then, if he credits the fraternity of teachers with knowing the closeness of this relation, he blames them most heartily for their unaccountably stupid way of teaching him. If we contrast this state of affairs with the state of affairs in the solid four-years' course in Latin, I think we are forced to the conclusion that the organization of instruction in Latin is much more perfect than that of the instruction in mathematics.

The following question arises: *Would it not be possible to organize the algebra, geometry, and physics of the secondary school into a thoroughly coherent four-years' course*, comparable in strength and closeness of structure with the four-years' course in Latin? (Here under physics I include astronomy and the more mathematical and physical parts of physiography.) It would seem desirable that, just as the systematic development of theoretical mathematics is deferred to a later period, likewise much of theoretical physics might well be deferred. Let the physics also be made thoroughly practical. At any rate, so far as the instruction of boys is concerned, the course should certainly have its character largely determined by the conditions which would be imposed by engineers. What kind of two- or three-years' course in mathematics and physics would a thoroughly trained engineer give to boys in the

[1] Why is it that one of the sanest and best-informed scientific men living, a man not himself an engineer, can charge mathematicians with killing off every engineering school on which they can lay hands? Why do engineers so strongly urge that the mathematical courses in engineering schools be given by practical engineers?

And why can a reviewer of "Some Recent Books of Mechanics" write with truth: "The students' previous training in algebra, geometry, trigonometry, analytic geometry and calculus as it is generally taught has been necessarily quite formal. These mighty algorithms of formal mathematics must be learned so that they can be applied with readiness and precision. But with mechanics comes the application of these algorithms, and formal, do-by-rote methods, though often possible, yield no results of permanent value. How to elicit and cultivate thought is now of primary importance"? (E. B. WILSON, *Bulletin Amer. Math. Soc.*, October, 1902.) "But is it conceivable that in any part of the education of the student the problem of eliciting and cultivating thought should not be of primary importance?

secondary school? Let this body of material postulated by the engineer serve as the basis of the four-years' course. Let the instruction in the course, however, be given by men who have received expert training in mathematics and physics as well as in engineering, and let the instruction be so organized that with the development of the boy, in appreciation of the practical relations, shall come simultaneously his development in the direction of theoretical physics and theoretical mathematics.

Perry is quite right in insisting that it is scientifically legitimate in the pedagogy of elementary mathematics to take a large body of basal principles instead of a small body, and to build the edifice upon the larger body for the earlier years, reserving for the later years the philosophic criticism of the basis itself and the reduction of the basal system.

To consider the subject of geometry in all briefness: With the understanding that proper emphasis is laid upon all the concrete sides of the subject, and that furthermore from the beginning exercises in informal deduction[1] are introduced increasingly frequently, when it comes to the beginning of the more formal deductive geometry, why should not the students be directed each for himself to set forth a body of geometric fundamental principles, on which he would proceed to erect his geometric edifice? This method would be thoroughly practical and at the same time thoroughly scientific. The various students would have different systems of axioms, and the discussions thus arising naturally would make clearer in the minds of all precisely what are the functions of the axioms in the theory of geometry. The students would omit very many of the axioms, which to them would go without saying. The teacher would do well not to undertake to make the system of axioms thoroughly complete in the abstract sense. "Sufficient unto the day is the precision thereof." The student would very probably wish to take for granted all the ordinary properties of measurement and of motion, and would be ready at once to accept the geometrical implications of co-ordinate geometry. He could then be brought with extreme ease to the consideration of fundamental notions of the calculus as treated concretely, and he would find those notions delightfully real and powerful, whether in the domain of mathematics or of physics or of chemistry.

To be sure, as Study has well insisted, for a thorough comprehension of even the elementary parts of Euclidean geometry the non-Euclidean geometries are absolutely essential. But the teacher is teaching the subject for the benefit of the students, and it must be admitted that beginners in the study of demonstrative geometry cannot appreciate the very delicate considerations involved in the thoroughly abstract science. Indeed, one may conjecture

[1] In an article that appeared in the *Educational Review*, April, 1903, on "The Psychological and the Logical in the Teaching of Geometry," PROFESSOR JOHN DEWEY calls attention to the evolutionary character of the education of an individual, and insists that there should be no abrupt transition from the introductory, intuitional geometry to the systematic, demonstrative geometry.

that, had it not been for the brilliant success of Euclid in his effort to organize into a formally deductive system the geometric treasures of his times, the advent of the reign of science in the modern sense might not have been so long deferred. Shall we then hold that in the schools the teaching of demonstrative geometry should be reformed in such a way as to take account of all the wonderful discoveries which have been made — many even recently — in the domain of abstract geometry? And should similar reforms be made in the treatment of arithmetic and algebra? To make reforms of this kind, would it not be to repeat more gloriously the error of those followers of Euclid who fixed his "Elements" as a text-book for elementary instruction in geometry for over two thousand years ago? Everyone agrees that professional mathematicians should certainly take account of these great developments in the technical foundations of mathematics, and that ample provision should be made for instruction in these matters; and on reflection, every one agrees further that this provision should be reserved for the later collegiate and university years.

The laboratory method.—This program of reform calls for the development of a thoroughgoing laboratory system of instruction in mathematics and physics, a principal purpose being as far as possible to develop on the part of every student the true spirit of research, and an appreciation, practical as well as theoretic, of the fundamental methods of science.

In connection with what has already been said, the general suggestions I now add will, I hope, be found of use when one enters upon the questions of detail involved in the organization of the course.

As the world of phenomena receives attention by the individual, the phenomena are described both graphically and in terms of number and measure relations of the phenomena enter fundamentally into the graphical depiction, and furthermore the graphical depiction of the phenomena serves powerfully to illuminate the relations of number and measure. This is the fundamental scientific point of view. Here under the term "graphical depiction" I include representation by models.

To provide for the needs of laboratory instruction, there should be regularly assigned to the subject two periods, counting as one period in the curriculum.

As to the possibility of effecting this unification of mathematics and physics in the secondary schools, objection will be made by some teachers that it is impossible to do well more than one thing at a time. This pedagogic principle of concentration is undoubtedly sound. One must, however, learn how to apply it wisely. For instance, in the physical laboratory it is undesirable to introduce experiments which teach the use of the calipers or of the vernier or of the slide rule. Instead of such uninteresting experiments of limited purpose, the students should be directed to extremely interesting problems which involve the use of these instruments, and thus be led to learn to use the instruments as a matter of course, and not as a matter of difficulty.

Just so the smaller elements of mathematical routine can be made to attach themselves to laboratory problems, arousing and retaining the interest of the students. Again, everything exists in its relations to other things, and in teaching the one thing the teacher must illuminate these relations.

Every result of importance should be obtained by at least two distinct methods, and every result of especial importance by two essentially distinct methods. This is possible in mathematics and the physical sciences, and thus the student is made thoroughly independent of all authority.

All results should be checked, if only qualitatively or if only "to the first significant figure." In setting problems in practical mathematics (arithmetical computation or geometrical construction) the teacher should indicate the amount or percentage of error permitted in the final result. If this amount of percentage is chosen conveniently in the different examples, the student will be led to the general notion of closer and closer approximation to a perfectly definite result, and thus in a practical way to the fundamental notions of the theory of limits and of irrational numbers. Thus, for instance, uniformity of convergence can be taught beautifully in connection with the concrete notion of area under a monotonic curve between two ordinates, by a figure due to Newton, while the interest will be still greater if in the diagram area stands for work done by an engine.

The teacher should lead up to an important theorem gradually in such a way that the precise meaning of the statement in question, and further, the practical—*i. e.*, computational or graphical or experimental—truth of the theorem, is fully appreciated; and, furthermore, the importance of the theorem is understood, and, indeed, the desire for the formal proof of the proposition is awakened, before the formal proof itself is developed. Indeed, in most cases, much of the proof should be secured by the research work of the students themselves.

Some hold that absolutely individual instruction is the ideal, and a laboratory method has sometimes been used for the purpose of attaining this ideal. The laboratory method has as one of its elements of great value the flexibility which permits students to be handled as individuals or in groups. The instructor utilizes all the experience and insight of the whole body of students. He arranges it so that the students consider that they are studying the subject itself, and not the words, either printed or oral, of any authority on the subject. And in this study they should be in the closest co-operation with one another and with their instructor, who is in a desirable sense one of them and their leader. Instructors may fear that the brighter students will suffer if encouraged to spend time in co-operation with those not so bright. But experience shows that just as every teacher learns by teaching, so even the brightest students will find themselves much the gainers for this co-operation with their colleagues.

In agreement with Perry, it would seem possible that the student might be brought into vital relation with the fundamental elements of trigonometry,

analytic geometry, and the calculus, on condition that the whole treatment in its origin is and in its development remains closely associated with thoroughly concrete phenomena. With the momentum of such practical education in the methods of research in the secondary school, the college students would be ready to proceed rapidly and deeply in any direction in which their personal interests might lead them. In particular, for instance, one might expect to find effective interest on the part of college students in the most formal abstract mathematics.

For all students who are intending to take a full secondary-school course in preparation for colleges or technological schools, I am convinced that the laboratory method of instruction in mathematics and physics, which has been briefly suggested, is the best method of instruction — for students in general, and for students expecting to specialize in pure mathematics, in pure physics, in mathematical physics, or astronomy, or in any branch of engineering.

Evolution, not revolution. — In contemplating this reform of secondary school instruction we must be careful to remember that it is to be accomplished as an evolution from the present system, and not as a revolution of that system. Even under the present organization of the curriculum the teachers will find that much improvement can be made by closer co-operation one with another; by the introduction, so far as possible, of the laboratory two-period plan; and in any event by the introduction of laboratory methods: laboratory record-books, cross-section paper, computational and graphical methods in general, including the use of colored inks and chalks; the co-operation of students; and by laying emphasis upon the comprehension of propositions rather than upon the exhibition of comprehension.

The junior colleges. — Just as the secondary schools should begin to reform without waiting for the improvement of the primary schools, so the elementary collegiate courses should be modified at once without waiting for the reform of the secondary schools. And naturally, in the initial period of reform, the education in each higher domain will involve many elements which later on will be transferred to a lower domain.

Further, by the introduction into the junior colleges of the laboratory method of instruction it will be possible for the colleges and universities to take up a duty which for the most part has been neglected in this country. For, although we have normal schools and other training schools for those who expect to teach in the grades, little attention has yet been given to the training of those who will become secondary-school teachers. The better secondary schools today are securing the services of college graduates who have devoted special attention to the subjects which they intend to teach, and as time goes on the positions in these schools will as a rule be filled (as in France and Germany) by those who have supplemented their college course by several years of university work. Here these college and university graduates proceed at once to their work in the secondary schools. Now, in the laboratory courses of the junior college, let those students of the senior col-

lege and graduate school who are to go into the teaching career be given training in the pedagogy of mathematics according to the laboratory system. For such a student the laboratory would be a laboratory in the pedagogy of mathematics; that is, he would be a colleague-assistant of the instructor. By this arrangement, the laboratory instruction of the colleges would be strengthened at the same time that well-equipped teachers would be prepared for work in the secondary schools.

The freedom of the secondary schools.—The secondary schools are everywhere preparing students for colleges and technological schools, and whether the requirements of those institutions are expressed by way of examination of students or by way of the conditions for the accrediting of schools or teachers, the requirements must be met by the secondary schools. The stronger secondary-school teachers too often find themselves shackled by the specific requirements imposed by local or by collegiate authorities. Teaching must become more of a profession. And this implies not only that the teacher must be better trained for his career, but that also in his career he be given with greater freedom greater responsibility. To this end closer relations should be established between the teachers of the colleges and those of the secondary schools; standing provisions should be made for conferences as to improvement of the secondary-school curricula and in the collegiate admission requirements; and the leading secondary school teachers should be steadily encouraged to devise and try out plans looking in any way toward improvement.

Thus the proposed four-years' laboratory course in mathematics and physics will come into existence by way of evolution. In a large secondary school, the strongest teachers, finding the project desirable and feasible, will establish such a course alongside the present series of disconnected courses —and as time goes on their success will in the first place stimulate their colleagues to radical improvements of method under the present organization and finally to a complete reorganization of the courses in mathematics and physics.

The American Mathematical Society.—Do you not feel with me that the American Mathematical Society, as the organic representative of the highest interests of mathematics in this country, should be directly related with the movement of reform, and to this end that the society, enlarging its membership by the introduction of a large body of the strongest teachers of mathematics in the secondary schools, should give continuous attention to the question of improvement of education in mathematics, in institutions of all grades? That there is need for the careful consideration of such questions by the united body of experts there is no doubt whatever, whether or not the general suggestions which we have been considering this afternoon turn out to be desirable and practicable. In case the question of pedagogy does come to be an active one, the society might readily hold its meetings in two divisions—a division of research and a division of pedagogy.

Furthermore, there is evident need of a national organization having its center of gravity in the whole body of science instructors in the secondary schools; and those of us interested in these questions will naturally relate ourselves also to this organization. It is possible that the newly formed Central Association of Physics Teachers may be the nucleus of such an organization.

CONCLUSION.

The successful execution of the reforms proposed would seem to be of fundamental importance to the development of mathematics in this country. I urge that individuals and organizations proceed to the consideration of the general question of reform with all the related questions of detail. Undoubtedly in many parts of the country improvements in organization and methods of instruction in mathematics have been making these last years. All persons who are, or may become, actively interested in this movement of reform should in some way unite themselves, in order that the plans and the experience, whether of success or failure, of one may be immediately made available in the guidance of his colleagues.

I may refer to the centers of activity with which I am acquainted. Miss Edith Long, in charge of the department of mathematics in the Lincoln (Neb.) High School, reports upon the experience of several years in the correlation of algebra, geometry, and physics, in the October, 1902, number of the *Educational Review*. In the Lewis Institute of Chicago, Professor P. B. Woodworth, of the department of electrical engineering, has organized courses in engineering principles and electrical engineering in which are developed the fundamentals of practical mathematics. The general question came up at the first meeting[1] (Chicago, November, 1902) of the Central Association of Physics Teachers, and it is to be expected that this association will enlarge its functions in such a way as to include teachers of mathematics and of all sciences, and that the question will be considered in its various bearings by the enlarged association. At this meeting informal reports were made from the Bradley Polytechnic Institute of Peoria, the Armour Institute of Technology of Chicago, and the University of Chicago. The question is evoking much interest in the neighborhood of Chicago.

I might explain how I came to be attracted to this question of pedagogy of elementary mathematics. I wish, however, merely to express my gratitude to many mathematical and scientific friends, in particular to my Chicago colleagues, Mr. A. C. Lunn and Professor C. R. Mann, for their co-operation with me in the consideration of these matters, and further to express the hope that we may secure the active co-operation of many colleagues in the domains of science and of administration, so that the first carefully chosen steps of a really important advance movement may be taken in the near future.

[1] Subsequent to the meeting of organization in the spring of 1902. Mr. Charles H. Smith of the Hyde Park High School, Chicago, is president of the Association. Reports of the meetings are given in *School Science* (Ravenswood, Chicago).

I close by repeating the questions which have been engaging our attention this afternoon.

In the development of the individual in his relations to the world, there is no initial separation of science into constituent parts, while there is ultimately a branching into the many distinct sciences. The troublesome problem of the closer relation of pure mathematics to its applications: can it not be solved by indirection, in that through the whole course of elementary mathematics, including the introduction to the calculus, there be recognized in the organization of the curriculum no distinction between the various branches of pure mathematics, and likewise no distinction between pure mathematics and its principal applications? Further, from the standpoint of pure mathematics: will not the twentieth century find it possible to give to young students during their impressionable years, in thoroughly concrete and captivating form, the wonderful new notions of the seventeenth century?

By way of suggestion these questions have been answered in the affirmative, on condition that there be established a thoroughgoing laboratory system of instruction in primary schools, secondary schools, and junior colleges — a laboratory system involving a synthesis and development of the best pedagogic methods at present in use in mathematics and the physical sciences.

ELIAKIM HASTINGS MOORE.

THE UNIVERSITY OF CHICAGO.

EDITORIAL NOTES.

GEORGE HERBERT LOCKE.

THE COMMITTEE OF ELEVEN

AT the Chicago meeting of the Department of Superintendence of the N. E. A. last year, Professor Hanus of Harvard read a paper on "Obstacles to Educational Progress," in which he pointed out the great waste that is continually going on because the efforts toward educational betterment are so sporadic and fugitive. We all are workers, but not always intelligent workers; we are achieving results, but too often these results are not scientific, and therefore are not distinctly helpful to those who are looking for light and aid. Again, our ignorance of what is being done, of contemporary educational practice, is a serious handicap as our sources of information seem decidedly inadequate. We depend upon educational periodicals or conventions for knowledge of the methods by which our neighbor engaged in practically the same work is endeavoring to solve the same great questions. In the periodicals we too often find theories more or less fanciful and practices divorced from their social surroundings. It is but seldom that an editor receives as interesting, comprehensive, suggestive, and withal simple statement as that of Miss Johnson of her experience in teaching English in a mining region,[1] and yet such descriptions are infinitely more suggestive than all the theories of the educational evangelist who desires to see his name in print. In conventions we are treated to even poorer things than appear in periodicals, for the spoken word is naturally more diffuse and emotional. It is this desire to know what is being done that leads so many men to avoid the general meetings of a convention and to spend their time more profitably by interviewing in the hotel lobbies men whom they know to be *doers*, and learning from them that which will be suggestive and stimulating. From reports of various kinds we glean certain scraps of information as to contemporary educational practice, but the concomitant circumstances, the social setting, the reasons and results seldom or never accompany the information to explain its significance.

True, the three great reports of the Committees of Ten, of Fifteen, and on College Entrance Requirements have given us much help, but, after all, these are to a great extent isolated documents, which, though valuable in themselves, do not exercise the unifying influence upon education that is so necessary that legitimate progress may be made. Those of us who have made the most careful study of these documents and are most appreciative

[1] SCHOOL REVIEW, Vol. X, pp. 666–74.

of the benefits received from the work of these committees are the very ones who feel the need of some report that will afford us more accurate knowledge of what is being done, that will critically examine these practices, and from this examination, reinforced by suggestions from those who are honestly trying to improve these practices, will formulate some general principles of education that will serve as a guide and stimulus to intelligent co-operative experimentation. The address of Mr. Hanus voiced the sentiments of so many thinking men that the department acted at once and nominated a committee of nine, since increased to eleven, "to formulate contemporary educational doctrine, submit statements covering contemporary educational experience, and indicate the tendency of contemporary educational method." This committee met recently in Washington to consider the object of the inquiry, the best methods to be pursued, and to map out the plan of campaign. The discussion soon made evident the fact that there was a stupendous task ahead, but one which was alluring because of the immense possibilities and the eager desire of the thinking schoolmen for practical help. The ground to be covered was pretty thoroughly examined, the main divisions of the investigation considered, the method of investigation determined, and reports from each member submitted, so that, when the indorsement is given by the N. E. A. at its approaching meeting, no delay will be experienced in getting the work started. It cannot be accomplished in a year, possibly not in two years, because the desire was so manifest in the committee that the results of this investigation should be thorough, and should present a body of facts and of conclusions that will serve, not only to increase the knowledge of what is being done, but to stimulate all educational workers to such experimentation on a scientific basis that the resulting progress will be economic. The personnel of the committee is a guarantee that there will be a thorough sifting of evidence before verdicts are rendered.

THE EXTENSION OF THE ELECTIVE SYSTEM AT YALE

YALE has at last thrown in her lot with the much-maligned advocates of the elective system, and in the meeting of the Corporation a few weeks ago made important changes. The subjects which are at present required for admission are English, ancient history, Latin, Greek, mathematics, and one modern language, namely, French or German. The new requirements, which go into effect in 1904, leave English, ancient history, and Latin unchanged, but will allow Greek to be wholly or in part superseded by an additional amount of mathematics or by a thorough knowledge of either French or German. The course of study in the freshman year is affected by this change, and the following arrangement has been made: The eight courses open to a freshman are to be: Greek, Latin, French, German, English, mathematics, chemistry, and history. Of these eight courses he will choose five, but under the restriction that three of his courses must be in continuation of three of the five studies (Greek, Latin, English, mathematics, or a modern language) already pursued

in a secondary school. By this restriction a connection between the work of the school and the college will be preserved, and every freshman will be required to continue the study of at least one of the three leading subjects — Greek, Latin, or mathematics — to which he gave the longest time in his school preparation.

The college curriculum at Yale may be described as follows: The unit of requirement is a course of study one hour a week through one year. The completion of sixty hours is required for the attainment of the degree of bachelor of arts — an amount which is claimed to be larger than is called for at other institutions similar to Yale. These sixty hours the student divides among the four years of his course. The courses of study are arranged in three grades — A, B, and C — which are naturally taken in successive years, as the A courses are elementary, the B courses more advanced, and the C courses involving generally some considerable amount of individual research. The students are subject to the same tripartite arrangement, and the classes are: (1) languages and literature; (2) mathematics and the natural and physical sciences; (3) philosophy, history, and the social sciences. Every student must complete before graduation two majors and three minors, and these must be so arranged that not more than two of these five units shall be in one of the above divisions of study. A major unit consists of connected courses of grades A, B, and C, aggregating at least seven hours a week; a minor unit consists of connected courses of A and B, aggregating at least five hours a week. This double provision aims, on the one hand, to encourage continuous work along some lines, and a certain degree of specialization along the line as evidenced by the individual research involved in these courses; on the other hand, it aims to encourage the students spreading their work over a variety of fields and thereby laying a broad foundation for their knowledge.

THE PROGRESS OF EDUCATION IN THE SOUTH

SPECIALLY appropriate is the term "conference" as applied to the meeting held some two months ago in Richmond, Va., when the interests of education in the South were discussed by men whose hearts are in the work, men of the North as well as of the South. The address of the president, Mr. Robert C. Ogden, was an admirable presentation of the object of the conference, of its personnel, of its moral and patriotic inspiration, and of the fields of usefulness which it proposed to occupy, so that it might justify the assertion that it existed for the advancement and promotion of the education of all the people. He struck the keynote of hopefulness, and throughout the conference no one seemed out of tune. Dr. McIver's description of his efforts to advance education in North Carolina by means of educational conferences, a systematic popular campaign for local taxation, and the organization and work of the Woman's Association for the Betterment of Public Schoolhouses in North Carolina, showed that substantial progress was being made in that state. There are

now seventy-nine towns and cities and rural districts that have a local tax, elections are pending in forty-five other communities, and in nearly one hundred other communities the question is being agitated. Dr. Frissil, in describing conditions in Virginia, stated that of the 1,900,000 inhabitants about nine-tenths live in the country, and that there are over six thousand white schools in rural districts which if properly consolidated might be reduced to two thousand and no child need go farther than two and a half miles. A very interesting result of consolidation in the South is that with it comes the lengthening of the school year. A strong plea was made for trained teachers and more normal schools; for three or four modern, well-equipped, and well-maintained schools established at conspicuous rural centers; and for each county to have a competent superintendent giving all his time to the schools and receiving a salary commensurate with his work. Illustrations of the plan of campaign show that this work does not end in emotional platitudes. President Alderman told of the work of Professor Hines, of Louisiana State University, in the parish of Calcasieu during the past year. There is in this parish a population of 35,000 people, among whom thirty meetings were held and seventy addresses delivered. The result of this activity is that one ward has voted a special tax of three mills, and five others have voted the five-mill tax, amounting to a total of $15,000. Professor Claxton, of Knoxville, Tenn., described the model country school which is to be established in Knox county. It will be a consolidated school, the house having six rooms for the accommodation of about 250 children and an assembly room for entertainments and other social gatherings. There will be twelve acres of land in connection with the school, a principal's house, an orchard, a vineyard, and a garden, all of which are to serve as suggestive to the inhabitants of the possibilities in architecture, agriculture, and horticulture. The course of study will be broad, and in addition to the three R's, elementary physics and chemistry, music, and domestic science will have places. It is likely that there will be at least six teachers, so that the work of this educational settlement may be properly done. Chancellor Kirkland touched a vital spot when he said: "The supreme need of the South is the improvement of the southern teacher. A consolidated school with a library and a good house is only dead matter until it is given life by the personality of a real teacher." This is being recognized throughout the southern country, and this summer the schools of inspiration, suggestion, and instruction, in connection with the various universities, will very materially help toward the development of an irresistible public opinion for the establishment and maintenance of a system of schools adequate for the needs of a free people so eloquently urged by President Alderman.

THIS is an era of expansion in the provision for secondary education for girls and boys. The American people believe that the public high school is a just charge upon the public treasury; that it is not a separate school for a

privileged class, but is the last four grades of the free public-school system, and to attend it is the privilege of all. We believe in equal opportunities for education, not in equal education; and in our enthusiastic belief in this part of our educational system we are erecting buildings out of the public funds that speak more eloquently than all the addresses that ever were made. Were we to be asked, What is the most prominent building in an American municipality, that in which the people take most pride? there would be no hesitation in answering: The school, and especially the high school. There is no better sign of the progress of this nation than that the interest of the people in erecting and being proud of the courthouse and jail has been transferred to the high school. The comfortable housing of the girls and boys has become a very interesting problem, and town vies with town in the desire to provide suitable accommodation so that the intellectual, moral, and physical training of those who are to be leaders should have the best material surroundings. The illustrations that have appeared from month to month in this journal are ample evidence, and these are but a very few — just enough to show the tendency. Feeling the importance of this problem, and recognizing that there are many of our readers who are contemplating the erection of new schools, we have devoted this number to the subject of architecture. The interest that was awakened as a result of the correspondence necessary to the carrying out of this design showed clearly what an interest there is in the work, what a pride there is in the possession of an adequate building, and what a great desire there is to make still greater progress. The development in the cities of New York and St. Louis is specially significant, and the articles on both these cities are authoritative.

HIGH SCHOOL ARCHITECTURE

THE September issue of this journal will be devoted to commercial education. The importance of this branch of the curriculum, its youth, its almost sad history, yet withal its necessity, render it an especially interesting subject to discuss. There will be illustrations of the new Commercial High School of New York city, and the relationship of commercial education to the other subjects of the curriculum will receive special attention.

OUR SEPTEMBER NUMBER

BOOK REVIEWS.

A Student's History of English Literature. By W. E. SIMONDS. Boston: Houghton, Mifflin & Co.

CERTAINLY progress has been made during the past few years in the publication of histories of English literature. At times we stand appalled before the number, which is increased almost monthly, and yet it is not difficult to select one now and then which is really worth while. Such I consider Professor William Edward Simonds's *A Student's History of English Literature.* This volume is a happy combination of the "practical text-book and a readable narrative."

The six chapters, covering four hundred and sixty pages, survey the various changes from the earliest Anglo-Saxon times to Swinburne, one of the last of the Victorians. It cannot be denied that the treatment is clear and sane, displaying the scholarly point of view and at the same time evading the pedantic. The style is decidedly interesting, and shows indeed that the author has read with profit from the masters of whom he treats with such sympathy. The plan of the book has evidently been to consider periods as represented by certain men, "to fix definitely the authors and tendencies which are of chief importance, and to give some insight into the movements of minor consequence." This proportion has been well observed.

Properly, it seems to us, Professor Simonds has given the essential literary and historical facts "indispensable even to an elementary knowledge of literary history." Thus chap. V has as subtitles: I, "The Augustan age of English Prose;" II, "The Poetry of Alexander Pope;" III, "The Rise of the English Novel;" IV, "Essayists of the Second Half;" V, "The Romantic Movement in English Poetry." If we may select any part of a book which deals with a great subject in a sympathetic way, we should choose that part of the fifth chapter dealing with the writers of Augustan age of English prose —Addison, Swift, Defoe, Johnson, and others. However, the nineteenth-century writers receive just attention. Especially delightful are the words on Lamb.

To teachers and pupils alike the suggestions closing each section will prove of value. Here are included the best editions, a short but well-selected bibliography, analysis of particular pieces with appropriate questions. The endeavor in these questions has been rather to make the reader do the thinking than to tell him everything. There are sixteen pages of such suggestions on Shakespeare, dealing with six of the principal plays, eight pages on Milton, ten pages on Scott, analyzing *Ivanhoe* as a sample novel.

The value of the history is enhanced by a map showing the places connected with literary history, a dozen or more facsimile and other illustrations, and an extensive index.

On the whole, the book is a perfectly sane and safe treatment in a thoroughly interesting manner of a theme which never grows old. "But the past is our heritage: what a heritage it is! what glorious minds these men possessed! what glorious souls! And these are forever our possession in our books."

WILL D. HOWE.

BUTLER COLLEGE,
Indianapolis, Ind.

NOTES.

THE NATIONAL EDUCATION ASSOCIATION.

Boston, July 6 to 10, 1903.

THIS year it is Boston that is to receive the educational host, and from all accounts the eastern center of culture has, under the able administration of President Eliot, prepared a welcome for all. The Official Bulletin issued by Secretary Irwin E. Shepard, Winona, Minn., gives full information in regard to fares, side trips, hotels and lodging houses, local afternoon excursions, mail, and indeed it anticipates all questions that might be raised by anyone who wished the minutest information in regard to the great gathering. The arrangements seem to be ahead of anything ever attempted, and the meeting ought to be one of the most profitable in the history of the Association. The limitations of space prevent us from reprinting the Announcement, but copies may be had by addressing Mr. Shepard. The general directions and the program are given here so that our readers may know of the attractions and be able to appreciate our enthusiastic advocacy.

PROGRAMS.

GENERAL SESSIONS.

(Session in Mechanics Hall.)

MONDAY EVENING, JULY 6.

Blessing—Rev. Edward Everett Hale, D.D., Boston, Mass.

Addresses of Welcome—Hon. John L. Bates, governor of the commonwealth of Massachusetts; Hon. Patrick A. Collins, mayor of the city of Boston; Henry S. Pritchett, president of the Massachusetts Institute of Techology, Boston, Mass.

Replies—Albert G. Lane, district superintendent of schools, Chicago, Ill.; Hon. W. T. Harris, United States Commissioner of Education.

1. President's Address—"The New Definition of the Cultivated Man," Charles W. Eliot, president of Harvard University, Cambridge, Mass.

2. "The Jeopardy of the Culture Element in Education"—E. Benjamin Andrews, chancellor of the University of Nebraska, Lincoln, Neb.

TUESDAY EVENING, JULY 7.

Topic: "Manual, Trade, and Technical Education"—Calvin M. Woodward, professor of mathematics and dean of the School of Engineering, Washington University, St. Louis. Mo.; Robert H. Thurston, professor of mechanical engineering, Cornell University, Ithaca, N. Y.; Thomas M. Balliet, superintendent of schools, Springfield, Mass.; Henry S. Pritchett, president of the Massachusetts Institute of Technology, Boston, Mass.

WEDNESDAY EVENING, JULY 8.

Topic: "School Gardens, City School Yards, and the Surroundings of Rural Schools"—Orville T. Bright, principal of the James R. Doolittle School, Chicago, Ill.; Charles R. Skinner, state superintendent of public instruction, Albany, N. Y.; Hon. Charles B. Aycock, governor of North Carolina; Henry L. Clapp, principal of the George Putnam School, Boston, Mass.

THURSDAY EVENING, JULY 9.

1. "The Teaching of Civics and Good Citizenship in the Public Schools"—R. W. G. Welling, New York city.

2. "The Justification of City Expenditure on Parks and Parkways—Material for Public Education"—Hon. Nathan Matthews, Jr., Boston, Mass.

3. "The Nature-Study Movement"—L. H. Bailey, professor of general and experimental horticulture, Cornell University, Ithaca, N. Y.

FRIDAY EVENING, JULY 10.

Topic: "Education in the Southern States"—Hon. Charles B. Aycock, governor of North Carolina; Wallace Buttrick, secretary and executive officer of the General Education Board, New York city; Edgar G. Murphy, secretary of the Southern Educational Board; Rev. Charles T. Walker, Augusta, Ga.

NOTE.—Owing to the change of the time of the opening session of the Boston Convention and the omission of all afternoon sessions, the time for the meeting of active members of the various states to select nominees for the General Nominating Committee, in accordance with By-law No. 1, is fixed for Tuesday morning at 9 o'clock at the respective state headquarters.

The Annual Meeting of Active Members will occur at 12 noon on Thursday, July 9. The place of meeting will be announced in the Official Program.

THE NATIONAL COUNCIL.

(Sessions in Second Church in Boston.)

MONDAY MORNING, JULY 6.

"The Voluntary Element in Education"—Charles De Garmo, professor of science and art of education, Cornell University, Ithaca, N. Y.

"Saving of Time in Elementary and Secondary Education"—Thomas M. Balliet, superintendent of schools, Springfield, Mass.; Mrs. Ella Flagg Young, professor of education, University of Chicago, Chicago, Ill.

MONDAY AFTERNOON, JULY 6.

"The Educational Progress of the Year"—Wm. DeWitt Hyde, president of Bowdoin College, Brunswick, Me.

TUESDAY MORNING, JULY 7.

"Religious Education"—George Albert Coe, professor of philosophy, Northwestern University, Evanston, Ill.; Rt. Rev. J. Lancaster Spalding, bishop of Peoria; W. T. Harris, U. S. Commissioner of Education.

DEPARTMENT OF KINDERGARTEN EDUCATION.

(Sessions in South Congregational Church.)

THURSDAY MORNING, JULY 9.

Topic: "The Extension of the Kindergarten Ideal into Other Fields of Education."

1. "Kindergarten Principles in Social Work"—Joseph Lee, vice-president of the Massachusetts Civic League, Boston, Mass.

2. "Kindergarten Principles n General Education"—Miss Sarah L. Arnold, dean of Simmons College, Boston, Mass.

General Discussion—Charles W. Eliot, president of Harvard University; Michael Anagnos, director Perkins Institution for the Blind, Boston, Mass.; James J. Greenough, master of Noble and Greenough's School, Boston, Mass.; F. Louis Soldan, superintendent of schools, St. Louis, Mo.

FRIDAY MORNING, JULY 10.

Topic: "The Kindergarten and the Community."

1. "The Kindergarten an Uplifting Influence in the Home and the District"—Richard Watson Gilder, editor of the *Century Magazine*, New York city.

2. "The Power of the Kindergarten Training School in the Education of Young Women"—Miss Caroline M. C. Hart, Baltimore Kindergarten Association, Baltimore, Md.

3. "The Scope and Results of Mothers' Classes"—Miss Elizabeth Harrison, principal of The Kindergarten College, Chicago, Ill.

General Discussion—Mrs. Marion M. B. Langzettel, New York city; Mrs. Ella Flagg Young, professor of education, University of Chicago, Chicago, Ill.; Paul H. Hanus, professor of the history and art of teaching, Harvard University, Cambridge, Mass.

DEPARTMENT OF ELEMENTARY EDUCATION.

(Sessions in South Congregational Church.)

TUESDAY MORNING, JULY 7.

1. "The Child and the Animal"—William J. Long, author of *Wood Folk*, etc., Stamford, Conn.

2. "Nature Study True to Life"—Clifton F. Hodge, Clark University, Worcester, Mass. Discussion—Wilbur S. Jackman, dean of School of Education, University of Chicago, Chicago, Ill.; Miss Emma G. Olmstead, principal of Training School, Scranton, Pa.

3. "The Child's Favorite Subject in the Elementary Curriculum"—Earl Barnes, staff lecturer of the American Society for Extension of University Teaching, Philadelphia, Pa.

4. "Breaking the Lock-Step"—William J. Shearer, superintendent of schools, Elizabeth, N. J. Discussion—J. H. Van Sickle, superintendent of schools, Baltimore, Md.; Miss Ada Van Stone Harris, supervisor of primary schools, Rochester, N. Y.

DEPARTMENT OF SECONDARY EDUCATION.

(Sessions in Central Congregational Church.)

THURSDAY MORNING, JULY 9.

1. *President's Address*—Charles F. Wheelock, head inspector University of the State of New York, Albany, N. Y.

2. "Tendencies as to the Enlargement of the Secondary Field"—Rueben Post Halleck, principal of Boys' High School, Louisville, Ky.; George D. Pettee, principal of University School, Cleveland, O.; Wilson Farrand, head master of Newark Academy, Newark, N. J.; Isaac Thomas, principal of Edmunds High School, Burlington, Vt.

General discussion.

3. *Conferences: Classics*—Leader, Henry White Callahan, head master, State Preparatory School, Boulder, Colo. *English*—Leader, Charles Swain Thomas, English Department, Shortridge High School, Indianapolis, Ind. *Principals*—Leader, William J. S. Bryan, principal of Normal and High School, St. Louis, Mo.; *topic*, "The Formation of a Federation of Secondary-School Associations."

FRIDAY MORNING, JULY 10.

1. "Co-education in the High School"—G. Stanley Hall, president of Clark University, Worcester, Mass.; Frank Fosdick, principal Masten High School, Buffalo, N. Y.; J. Remsen Bishop, principal of Walnut Hills High School, Cincinnati, O.; J. A. Bivins, principal of High School, Charlotte, N. C. Discussion.

2. "The Teaching of Argumentative Discourse in High Schools"—G. P Baker, assistant professor of English, Harvard University, Cambridge, Mass.

3. *Conferences: Mathematics*—Leader, David Eugene Smith, professor of mathematics, Teachers College, Columbia University, New York city. *History*—Leader, James Sullivan, principal of School of Commerce, New York city.

DEPARTMENT OF HIGHER EDUCATION.

(Sessions in Central Congregational Church.)

TUESDAY MORNING, JULY 7.

Topic: "The Length of the Baccalaureate Course, and the Preparation for the Professional Schools." Papers—Charles W. Eliot, president of Harvard University; Nicholas Murray Butler, president of Columbia University. Discussion—Elmer E. Brown, professor of theory and practice of education, University of California; Daniel W. Hering, professor of physics, Teachers College, Columbia University.

WEDNESDAY MORNING, JULY 8.

Topic: "Shall the University concern itself more directly with the morals and manners of its students? If so, by what methods and devices? Should there be in every college and university a medical visitor who should also be an advisor for students on all matters relating to health and disease?" Papers—George Harris, president of Amherst College; William J. Tucker, president of Dartmouth College; W. F. Slocum, president of Colorado College; Rev. Thomas Frank Gailor, bishop of Tennessee, Nashville, Tenn.

DEPARTMENT OF NORMAL SCHOOLS.

(Sessions in Arlington Street Church.)

TUESDAY MORNING, JULY 7.

1. "The Future of the Normal School," Charles S. Chapin, principal of the State Normal School, Providence, R. I.

2. "The City Normal School of the Future," Francis Burke Brandt, professor of pedagogy, Central High School, Philadelphia, Pa.

General Discussion — Opened by C. F. Carroll, superintendent of schools, Worcester, Mass.; P. P. Claxton, professor of pedagogy, University of Tennessee, Knoxville, Tenn.

3. "Does the Teacher's Knowledge of a Subject Differ from the Scholar's Knowledge?" W. W. Parsons, president of State Normal School, Terre Haute, Ind.; David Eugene Smith, professor of Mathematics, Teachers College, New York city. Discussion — Opened by F. Louis Soldan, superintendent of schools, St. Louis, Mo.; John W. Cook, president of the Northern Illinois State Normal School, DeKalb, Ill.

WEDNESDAY MORNING, JULY 8.

1. Conditions for Admission to Normal Schools," Walter P. Beckwith, principal of the State Normal School, Salem, Mass.; R. H. Halsey, president of the State Normal School, Oshkosh, Wis. Discussion — Opened by C. T. McFarlane, principal of the State Normal School, Brockport, N. Y.; E. W. Bohannan, president of the State Normal School, Duluth, Minn.; E. L. Hendricks, superintendent of schools, Delphi, Ind.; Frank A. Hill, secretary of the State Board of Education, Boston, Mass.

2. "The Academic Side of Normal-School Work," Henry Johnson, teacher of history, Eastern Illinois State Normal School, Charleston, Ill.

3. "To What Extent and in What Manner Can the Normal School Increase its Scholarship: (*a*) Without Diminishing its Output; (*b*) Without Increasing its Cost Too Greatly; (*c*) Without Infringing upon the Legitimate Liberal Arts Course of the College?"— James M. Green, principal of the State Normal School, Trenton, N. J. Discussion — Opened by Albert Leonard, editor of the *Journal of Pedagogy*, Boston, Mass.; Henry G. Williams, dean of the State Normal College, Ohio University, Athens, O.; Charles DeGarmo, professor of the Science and Art of Education, Cornell University, Ithaca, N. Y.

DEPARTMENT OF MANUAL TRAINING.

(Sessions in Old South Church.)

TUESDAY MORNING, JULY 7.

Topic: "Trade Schools."

1. "The Demand for Trade Schools." (*a*) "From the Manufacturer's Point of View"— Milton P. Higgins, president of the Norton Emery Wheel Co., Worcester, Mass.; (*b*) "From the Educator's Point of View"— Arthur H. Chamberlain, principal of the Normal School of Throop Polytechnic Institute, Pasadena, Calif. Discussion — L. D. Burlingame, chief draughtsman, Brown & Sharpe Manufacturing Co., Providence, R. I.

2. "The Organization of Trade Schools." (*a*) "From the Point of View of the School Superintendent"— Thomas M. Balliet, superintendent of schools, Springfield, Mass.; (*b*) "From the Point of View of the Director of a Trade School"— Arthur L. Williston, director of the Department of Science and Technology, Pratt Institute, Brooklyn, N. Y. Discussion and Suggestions from Experience— Charles A. Bennett, head of Department of Manual Arts, Bradley Polytechnic Institute, Peoria, Ill.; Arthur A. Hamerschlag, consulting engineer, New York Trade School, New York city.

3. "Trade Schools and Workingmen's Organizations"—William H. Sayward, secretary of the National Association of Builders, Boston, Mass. Discussion.

WEDNESDAY MORNING, JULY 8.

(Joint Session with Art and Elementary Departments.)

Topic: "The Relation of Art Teaching to Manual Training and Industrial Training."

1. "Craftsmanship in Education"— Leslie W. Miller, principal of the School of Industrial Art of the Pennsylvania Museum, Philadelphia, Pa. Discussion — Laurin H. Martin, instructor in applied design, Massachusetts Normal Art School, Boston, Mass.; Robert D. Andrews, architect, Boston, Mass.; Albert Kingsbury, professor of applied mechanics, Worcester Polytechnic Institute, Worcester, Mass.; Walter S. Goodnough, director of art and manual training, Public Schools, Brooklyn, N. Y.

2. "Art Instruction as Related to Manual Work"— Alfred Vance Churchill, director of Department of Fine Arts, Teachers College, Columbia University, New York city. Discussion — (*a*) "With Relation to Elementary Schools"— James Frederick Hopkins, director of drawing, Public Schools, Boston, Mass.; (*b*) "With Relation to the High School"— Fred H. Daniels, supervisor of drawing, Springfield, Mass.; (*c*) "From the Point of View of the Manual-Training Teacher — Luther W. Turner, instructor in Manual Training, Hill School, Pottstown, Pa.

3. "Indian Basketry: Its Poetry and Symbolism"— George Wharton James, Pasadena, Calif.

THURSDAY MORNING, JULY 9.

(Joint Session with Indian and Elementary Departments.)

Topic: "Practical Suggestions on a Wide Application of the Manual-Training Principle"

1. "Some Reasons Why Elementary Schools Should Include Manual Training in Their Courses of Instruction"— Elizabeth Euphrosyne Langley, assistant in manual training, School of Education, University of Chicago, Chicago, Ill.

"The Boy and His Handicraft"— George H. Bryant, president of the Eastern Manual-Training Association, Newport, R. I.

General Discussion — Frank M. Leavitt, supervisor of manual training, Boston, Mass.; Carroll G. Pearse, superintendent of schools, Omaha, Neb.

3. "Hand Work for High-School Girls"— Miss Abby L. Marlatt, instructor in Domestic Science, Manual Training High School, Providence, R. I., chairman of the Lake Placid Conference on Home Economics.

4. "The Practical Value of Manual Training"— James P. Haney, M. D., director of manual training, New York city.

General Discussion — Miss Lillie Collamore Smith, instructor in domestic science, High School, Brookline, Mass.; Arthur D. Dean, first assistant, Mechanic Arts High School, Springfield, Mass.; Calvin N. Kendall, superintendent of schools, Indianapolis, Ind.

DEPARTMENT OF ART EDUCATION.

(Sessions in Old South Church.)

FRIDAY MORNING, JULY 10.

1. "The Teaching of Art"— Denman W. Ross, lecturer on the theory of design, Harvard University, Cambridge, Mass. Discussion — Questions.

2. "Considerations for a Practical Study of Drawing in Public Schools"— Miss Bonnie E. Snow, supervisor of drawing, Minneapolis, Minn. Discussion — Charles M. Carter, director of art, city schools, Denver, Colo.; Solon P. Davis, director of art, city schools, Hartford, Conn.; William A. Mason, director of art, city schools, Philadelphia, Pa.

DEPARTMENT OF MUSIC EDUCATION.

(Sessions in New England Conservatory of Music.)

WEDNESDAY MORNING, JULY 8.

1. President's Address — Sterrie A. Weaver, supervisor of music, Westfield, Mass., and Torrington, Conn.

2. "The Training in Sight-Singing and Song Interpretation Which the Body of Normal-School Students Should Receive"—C. A. Fullerton, teacher of music, State Normal School, Cedar Rapids, Iowa; Julia E. Crane, Normal Institute of Music, Potsdam, N. Y.; A. Stanley Osborne, teacher of music, State Normal School, New Paltz, N. Y.; Miss Caroline V. Smith, teacher of music, State Normal School, Winona, Minn.

3. "The Real Purpose of Teaching Public-School Music"— Samuel W. Cole, supervisor of school music, Brookline, Mass.; Miss Mary Macskinner, principal of the Pierce School, Brookline, Mass.

4. "School Music — Has It Made Music Readers?" George W. Wilmot, supervisor of music, New Brunswick, N. J.; Ralph Baldwin, supervisor of school music, Northampton, Mass.

THURSDAY MORNING, JULY 9.

1. "Harmony as a Subject to be Counted for Admission to College"— Eugene D. Russell, principal of Classical High School, Lynn, Mass.

(Program incomplete.)

DEPARTMENT OF BUSINESS EDUCATION.

(Sessions in First Church in Boston.)

TUESDAY MORNING, JULY 7.

1. President's Address — "Commercial Education: Cultural or Vocational, Which?" J. H. Francis, principal of the Commercial High School, Los Angeles, Calif.

2. "Commercial Education and College-Entrance Requirements"—W. A. Scott, director of the school of commerce, University of Wisconsin, Madison, Wis.

General Discussion.

3. "The Disciplinary Value of Bookkeeping as a Study"— Enos Spencer, president Spencerian Business College, Louisville, Ky.

4. "History in Commercial Work — Its Practical Value, Character, and Place in the Course"— C. A. Herrick, professor of history, Central High School, Philadelphia, Pa.

General Discussion.

WEDNESDAY MORNING, JULY 8.

1. "Commercial Geography: The New Science — Its Practical Value, Character, and Place in the Course"— Frank O. Carpenter, master, Department of Commerce and Law, English High School, Boston, Mass.

2. "Science in Commercial Work — Its Practical Value, Character, and Place in the Course"— Frank M. Gilley, instructor in physics and chemistry, High School, Chelsea, Mass.

3. "Mathematics in Commercial Work — Its Practical Value, Character, and Place in the Course" — E. L. Thurston, instructor in mathematics, Business High School, Washington, D. C.

4. "The Disciplinary Value of Stenography and Typewriting as Studies"— W. H. Wagner, instructor in stenography and typewriting, Commercial High School, Los Angeles, Calif.

General Discussion.

FRIDAY MORNING, JULY 10.

Round Table Conference.

Subject: Report of the Committee of Ten on "A Commercial Course for American High Schools" — D. W. Springer, chairman, Ann Arbor, Mich.

DEPARTMENT OF CHILD STUDY.

(Sessions in First Baptist Church.)

TUESDAY MORNING, JULY 7.

Topic: "Child Study in Relation to Elementary Education."

1. "A Study Based on the Children of a State"— Earl Barnes, staff lecturer of American Society for Extension of University Teaching, Philadelphia, Pa. Discussion — Miss Lillie A. Williams, professor of psychology, State Normal School, Trenton, N. J.

2. "The Teacher's Practical Application of the Results of Child Study"— F. E. Spaulding, superintendent of schools, Passaic, N. J. Discussion — George E. Johnson, dean of Lower School, University School, Cleveland, O.; Ida C. Bender, M. D., supervisor of primary grades, Buffalo, N. Y.

3. "The Health and Growth of School Children"—W. W. Hastings, professor of physical training, International Y. M. C. A. Training School, Springfield, Mass. Discussion — George W. Fitz, M. D., Boston, Mass.

4. "School Hygiene in its Bearing on Child Life"—Thomas D. Wood, M. D., professor of physical education, Teachers College, Columbia University, New York city. Discussion — "Medical Inspection of Schools"— Homer W. Zirkle, principal of the Elmwood School, Denver, Colo.; C. P. Cary, state superintendent of public instruction, Madison, Wis.

THURSDAY MORNING, JULY 9.

Topic: "Child Study in Relation to Secondary Education."

1. "Sex Differentiation in Relation to Secondary Education"— A. H. Yoder, professor of pedagogy, University of Washington, Seattle, Wash. Discussion — Edwin D. Starbuck, associate professor of education, Stanford University, Calif.; Z. X. Snyder, president state normal school, Greeley, Colo.

2. "The Percentage of Boys Who Leave the High Schools, and the Reasons Therefor"— A. Caswell Ellis, associate professor of education, University of Texas, Austin, Tex. Discussion — J. W. Carr, superintendent of schools, Anderson, Ind.

3. "How to Increase the Attendance of Boys in the High School"—J. K. Stableton, superintendent of schools, Bloomington, Ill. Discussion—(1) "Self-Direction as a Motive for Increasing Attendance"—Colin A. Scott, Boston Normal School, Boston, Mass.: (2) "Influence of Men and Women Teachers" Sanford Bell, professor of pedagogy, Mt. Holyoke College, South Hadley, Mass.

4. "Psychic Arrest in Adolescence"—G. Stanley Hall, president of Clark University, Worcester, Mass. Discussion.

DEPARTMENT OF PHYSICAL TRAINING.

Wednesday Morning, July 8.

1. President's Address, "Physical Education and Brain-Building"—William O. Krohn, Chicago, Ill.

2. "Physical Sanity and Outdoor Life"—Frederick Manley, author and lecturer, Boston, Mass.

3. "The Place of Physical Education in the Curriculum: Should it be Fundamental or Incidental?"—E. W. Lyttle, inspector of schools, University of the State of New York, Albany, N. Y.

4. Symposium—"How to Improve Public-School Gymnastics" (five minutes allowed each speaker). Luther M. Gurlick, Pratt Institute, Brooklyn, N. Y.; E. H. Arnold, New Haven, Conn.; Miss Amy Morris Homans, Boston Normal School of Gymnastics, Boston, Mass.; Thomas D. Wood, Columbia University, New York city; Miss A. C. Skeele, State Normal School, North Adams, Mass.; Miss Edith MacClure Love, director Woman's Gymnasium, State Normal School, Terre Haute, Ind.; Miss Mabel L. Pray, director physical training, public schools, Toledo, O.; James Fitzgerald, director physical training, public schools, Boston, Mass.

Wednesday Afternoon (2 o'clock).

Illustrative Exercises in Physical Training, directed by Baroness Rose Posse, vice-president of the Department.

Friday Morning, July 10.

1. "Tests of Efficiency in Normal-School Gymnastics"—Baroness Rose Posse, director of Posse Gymnasiun, Boston, Mass.

2. "Physical Training for the Mass of Students"—Dr. William G. Anderson, director of the gymnasium, Yale University, New Haven, Conn.; F. N. Whittier, director of the gymnasium, Bowdoin College, Brunswick, Me. Discussion—John R. Kirk, president of the State Normal School, Kirksville, Mo.

3. "Recreative Physical Exercise"—Ernst Hermann, superintendent of the Thomas G. Plant Company's Gymnasium for its Employees, Boston, Mass.

DEPARTMENT OF SCIENCE INSTRUCTION.

(Sessions in First Church in Boston.)

Thursday Morning, July 9.

Topic: "Geology and Geography."

1. "Practical Methods in the Teaching of Geology"—N. S. Shaler, professor of geology, Harvard University, Cambridge, Mass.

2. "Out-of-Door Class Work in Geography"—F. P. Gulliver, teacher of geography, St. Mark's School, Southboro, Mass.

3. "Some Practical Methods of Geography Teaching in the Grades"—Mrs. L. A. Hitchcock, special teacher of geography, public schools, Meriden, Conn.

Topic: "Botany and Zöology."

1. "The Teaching of Biology in the High Schools"—A. S. Pearse, head of biological department, Omaha High School, Omaha, Neb.

2. "The Normal-School Side of Biologic Instruction"—L. J. Rettger, department of biology, Indiana State Normal School, Terre Haute, Ind.

Topic: "Physiology."

1. "Laboratory Teaching of Physiology"—W. T. Porter, M.D., professor of physiology, Harvard Medical School, Boston, Mass.

2. "Laboratory Work in High-School Physiology"—James E. Peabody, department of biology, Morris High School, New York city.

Friday Morning, July 10.

Topic: "Chemistry."

1. "College Chemistry and its Relation to Work Preparatory to it"—Ira Remsen, president of Johns Hopkins University, Baltimore, Md.

2. "High-School Chemistry in its Relation to the Colleges"—Rufus P. Williams, teacher of chemistry, English High School, Boston, Mass.

General discussion—(*a*) "From the College Standpoint"—H. P. Talbot, professor of analytical chemistry, Massachusetts Institute of Technology, Boston, Mass.; (*b*) "From the High-School Standpoint"—Lyman G. Smith, president of the New England Association of Chemistry Teachers; Albert S. Perkins, senior teacher of chemistry, High School, Dorchester, Mass.; (*c*) "The Normal-School View of Chemistry Teaching"—Lyman C. Newell, instructor of chemistry and Physics, State Normal School, Lowell, Mass.; (*d*) "From the City Superintendent's Point of View"—W. F. Kunze, superintendent of schools, Red Wing, Minn.

Topic: "Physics."

1. "College Physics"—LeRoy C. Cooley, professor of physics, Vassar College, Poughkeepsie, N.Y.

2. "The High-School Phase of Physics Teaching"—Irving O. Palmer, teacher of physics, High School, Newtonville, Mass.; George R. Twiss, department of science, Central High School, Cleveland, O.; J. C. Packard, High School, Brookline, Mass.

3. "A Course in Physics for Technical High Schools"—Charles F. Warner, principal of Mechanic Arts High School, Springfield, Mass.

DEPARTMENT OF SCHOOL ADMINISTRATION.

(Sessions in Normal Art School.)

WEDNESDAY MORNING, JULY 8.

1. "School Boards: Number of Members, Term of Service, Mode of Selection"—Calvin W. Edwards president of the Board of Education, Albany, N. Y.; Grafton D. Cushing, president of the School Committee, Boston, Mass. Discussion—John E. Myer, member of Board of Education, Auburn, N. Y.; Charles Holden, member of Board of Education, Grand Rapids, Mich.; H. H. Shedd, Ashland, Neb.

2. "School Boards, Their Functions: Legislative, Executive, and Judicial"—B. F. Hunsicker, president of Board of Education, Reading, Pa. Discussion—Joseph Packard, president of Board of Education, Baltimore, Md.: L. C. Newton, president of Board of Education, Detroit, Mich.; Henry A. Rogers, president of Board of Education, New York city; A. Lawrence Lowell, ex-member of the School Committee, Boston, Mass.

THURSDAY MORNING, JULY 9.

1. "Consolidation of Rural Schools"—W. K. Fowler, state superintendent of Public Instruction, Lincoln, Neb.; Frank A. Hill, secretary of the State Board of Education, Boston, Mass. Discussion—O. J. Kern, superintendent of country schools, Rockford, Ill.; L. D. Bonebrake, state school commissioner, Columbus, O.

2. "Schoolhouse Architecture"—Edmund M. Wheelwright, school architect, Boston, Mass. Discussion—C. H. Parsons, school architect, Des Moines, Iowa.

LIBRARY DEPARTMENT.

(Sessions in Second Church in Boston.)

WEDNESDAY MORNING, JULY 8.

General Theme: "Co-operation of the Public Libraries with the Public Schools."

1. Announcements and brief Opening Address by the President of the Department, James H. Canfield, librarian of Columbia University, New York city.

2. "Some Co-operative Suggestions"—Alfred Bayliss, state superintendent of public instruction, Springfield, Ill.

3. "Public Library Work for Public Schools"—Miss Electra C. Doren, librarian, Public Library, Dayton, O.

4. "Class Libraries"—C. G. Leland, director of school libraries, New York city.

5. "Is the Public Library a Promptuary for the Public Schools?"—N. D. C. Hodges, librarian, Public Library, Cincinnati, O.

General Discussion—Opened by Fred W. Nichols, superintendent of schools, Evanston, Ill.

FRIDAY MORNING, JULY 10.

1. Address by Representative of the American Library Association.

2. "The Library as an Adjunct to the Secondary School"—E. O. Holland, Male High School, Louisville, Ky.

3. "Some Experiments in Nebraska"—Miss Clara B. Mason, principal of the Clifton Hill School, Omaha, Neb.

4. "From the School to the Library"—Charles B. Gilbert, New York city.

5. "Library Instruction in the Normal Schools"—William H. Brett, librarian, Public Library, Cleveland, O.

6. "What May Be Accomplished by Definite Instruction in the Normal Schools"—Miss Mary Eileen Ahern, editor of *Public Libraries*, Chicago, Ill.

General Discussion—Opened by Nathan C. Schaeffer, state superintendent of public instruction, Harrisburg, Pa.; continued by James M. Green, principal of the State Normal School, Trenton, N. J.; and Eliphalet Oram Lyte, principal of the State Normal School, Millersville, Pa.

DEPARTMENT OF SPECIAL EDUCATION.

(Sessions in First Baptist Church.)

WEDNESDAY MORNING, JULY 8.

1. President's Address—Edward E. Allen, principal of the Pennsylvania Institution for the Instruction of the Blind, Philadelphia, Pa.

2. "The Influence of the Study of the Unusual Child upon the Teaching of the Usual"—Frank H. Hall, ex-superintendent of the Institution for the Blind, Jacksonville, Ill.; George E. Johnson, dean of the lower school, University School, Cleveland, O. Discussion—Francis Burke Brandt, professor of pedagogy, Central High School, Philadelphia, Pa.

3. "Should the Scope of the Public-School System be Broadened to Take in All Children Capable of Education; and, if so, How Should This be Done?"—Alexander Graham Bell, Washington, D. C.; Miss Mary C. Green, ex-superintendent of special classes for the blind in the board schools, London, England. Discussion—Thomas D. Woods, M.D., professor of physical training, Teachers College, Columbia University, New York city; Miss Ellen Le Garde, director of physical training, including that of back-

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ward children, public schools, Providence, R. I.; G. Ferreri, ex-vice-principal of the School for the Deaf, Siena, Italy.

4. "Report of Commission on Statistics Relative to Children in the Public Schools of the United States Who Need Special Methods of Instruction"—F. W. Booth, editor *Association Review*, Philadelphia, Pa.

FRIDAY MORNING, JULY 10.

1. "How Can the Term 'Charitable' be Justly Applied to the Education of any Children?"—Charles W. Birtwell, general secretary, Children's Aid Society. Boston, Mass.; Edward A. Fay, vice-president of Gallaudet College, Washington, D. C., editor of *American Annals of the Deaf*. Discussion.

2. "What Teachers Need to Know about Sense Defects and Impediments: Messages Chiefly from Specialists in Medicine"—Clarence J. Blake, M.D., professor of otology, Harvard Medical School, Boston, Mass.; Myles Standish, M.D., instructor in ophthalmology, Harvard Medical School, Boston, Mass.; Allen Greenwood, M.D., ophthalmologist, Boston, Mass.; Eugene Crockett, M.D., specialist on diseases of the nose and naso-pharynx, Boston, Mass.; Mrs. E. J. Ellery Thorpe, specialist on speech defects, Newton Center, Mass. Discussion.

DEPARTMENT OF INDIAN EDUCATION.

(Sessions in Huntington Hall.)

TUESDAY MORNING, JULY 7.

Topic: "Citizenship."

1. President's Address: "Our Work, Its Progress and Needs"—H. B. Peairs, superintendent Haskell Institute, Kansas (20 minutes).

2. "The Essential Qualifications for Good Citizenship."—Dr. James H. Canfield, librarian of Columbia University, New York city (20 minutes).

3. Address—Dr. Sheldon Jackson, general agent of education in Alaska.

4. "To What Degree has the Present System of Indian Schools been Successful in Qualifying for Citizenship?"—Dr. H. B. Frissell, principal of Hampton Normal and Agricultural Institute, Va. (20 minutes).

5. "Some of the Conditions Which Prevent a Greater Degree of Success in Qualifying for Citizenship"—(*a*) Office—J. H. Dortch, Washington, D. C. (7 minutes); (*b*) Training Schools—Wm. M. Peterson, assistant superintendent, Chilocco, Okla. (7 minutes); (*c*) Reservation Schools—E. D. Moss-

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mann, superintendent Cheyenne River School, South Dakota (7 minutes); (*d*) Field—Jesse F. House, supervisor of Indian Schools (7 minutes).

6. "Preparing the Indian Boy and Girl for Vigorous Struggles with the Conditions under Which Their People Live"—J. E. Jenkins, inspector of Indian schools (20 minutes).

7. "Local Conditions; Special Training"—(*a*) North—Chas. F. Pierce, superintendent Riggs Institute, South Dakota (7 minutes); (*b*) Southwest—to be supplied; (*c*) Oklahoma, Indian Territory, and North Central States—L. M. Compton, superintendent Tomah School, Wisconsin (7 minutes); F. A. Thackery, superintendent Shawnee School, Oklahoma (7 minutes); (*d*) Northwest—E. L. Chalcraft, supervisor, Indian Schools (7 minutes).

Resolved, That any expenditure of public money to segregate Indians and to build up and strengthen their tribal life is unwarranted because against the best interests of both the Indians and the government. —Col. R. H. Pratt, superintendent Carlisle Indian School, Pennsylvania (20 minutes).

WEDNESDAY MORNING, JULY 8.

Topic: "Character Building."

1. Address — Edwin A. Alderman, president of Tulane University, New Orleans, La. (20 minutes.)

2. "The White Man's Burden *versus* Indigenous Development for the Lower Races"— G. Stanley Hall, president of Clark University, Worcester, Mass. (20 minutes.)

3. Address, William R. Harper, president of University of Chicago. (20 minutes.)

4. "Heart Culture"— Charles F. Meserve, president of Shaw University, Raleigh, N. C. (20 minutes.)

5. "The Distribution of Good Literature among Indian Students"— Miss Frances C. Sparhawk, Newton Center, Mass. (7 minutes.)

6. "Establishment of Employment Bureaus for Former Students"— Dr. Merrill E. Gates, Board of Indian Commissioners, Washington, D. C. (Conditional.)

7. Give Indians Work Instead of Annuities"— John R. Brennan, Indian Agent, Pine Ridge, S. D.

8. "Cultivating the Work Spirit among Indian Pupils"— Axel Jacobsen, superintendent of Indian School, Wittenburg, Wis.

9. Address — John R. Clarke, Boston, Mass.

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FRIDAY MORNING, JULY 10.

Industrial and Miscellaneous Round Table:

1. Address — Dr. A. E. Winship, Boston, Mass. (20 minutes.)
2. Address — Frank Wood, Boston, Mass. (7 minutes.)
3. Address — Hamlin Garland, New York city.
4. "Native Industries" — Mrs. J. C. Hart, principal teacher, Oneida Indian School, Oneida, Wis. (5 minutes.)
5. "Transfer of Indian Children" — Edgar A. Allen, assistant superintendent of Indian School, Carlisle, Pa. (10 minutes.)
6. "School Gardens and Improvement of School Grounds" — Miss Louise Klein-Miller, Lowthorpe-Groton, Mass. (20 minutes.)
7. "Co-operation of Indian Schools with Local State Agricultural Schools" — A. O. Wright, supervisor of Indian Schools. (20 minutes.)
8. "Agricultural Instruction in Reservation Schools" — J. Thomas Hall, superintendent Crow Creek School, South Dakota; C. F. Werner, principal teacher, Flathead School, Montana. (5 minutes each.)
9. "The First and Most Important Step toward the Absorption of the Indian is to Teach Him to Earn His Living" — Miss M. Burgess, superintendent of printing, Carlisle, Pa. (7 minutes.)

NOTE — There will be an exhibit of Indian trade-school work, of Indian basketry and other handicrafts, and of manual-training work for boys and girls of all grades of Indian schools, in the rooms adjoining Huntington Hall on the second floor of the Rogers Building of the Massachusetts Institute of Technology. A general invitation to members and to the citizens of Boston to inspect this exhibit is cordially extended.

MEMBERSHIP REGISTRATION BUREAU—JOINT RAILWAY AGENCY—COMMITTEE ON ACCOMMODATIONS.

By courtesy of the president and faculty of the Massachusetts Institute of Technology, the Membership Registration Bureau, the Joint Railway Agency, and the Local Committee on Assignment of Accommodations will be located in the Walker Building of the Institute, on Copley Square, opposite Trinity Church.

All persons attending the convention should report immediately on arrival in Boston at the Registration Bureau, exchange the railway membership coupon for an N. E. A. membership certificate and

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badge, and at the same time deposit the railway ticket with the Joint Railway Agent if extension of time for return is desired. In all cases the membership registration should be made before the railway ticket is deposited with the Joint Agent. The assignment of boarding accommodations will be made at the same time and place to registered members only.

All persons may register as members, either Active or Associate, by surrendering the railway membership coupon or by paying the membership fee. A statement of conditions and advantages of Active membership may be found on another page.

THE PURCHASE OF TICKETS.

Care should be taken in the purchase of tickets to see that a special "N. E. A." ticket is obtained bearing an N. E. A. membership coupon which will, by exchange in Boston, as above directed, secure all special reduced rates and other privileges of membership, including a "Coupon for the Volume" of Proceedings of the Boston convention.

In all cases the purchaser should read the contract on the ticket and secure from the selling agent explanations of any provisions not fully understood. This will prevent errors, which are always embarassing and often impossible to correct later.

DEPOSIT AND VALIDATION OF TICKETS.

It should be remembered that no tickets are good for return from Boston before July 8; that tickets on which extension of time is desired for return later than July 12 must be deposited with the Joint Agent before 6 P. M., July 11; and that all tickets, whether deposited or not, must be validated by the Joint Agent immediately before starting on the return trip.

A charge of fifty cents will be made by the Joint Agent for the deposit and validation of each ticket on which extension is granted; and a charge of twenty-five cents for each ticket not extended requiring validation only.

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Passengers arriving via the Boston & Albany Railroad are advised to leave the train at the Huntington Avenue Station, one block from Copley Square; passengers arriving over the lines of the New York, New Haven & Hartford Railroad should leave the train at the Back Bay station, one block from Copley Square.

If passengers go into the terminal (South) station a transfer to Copley Square may be made via elevated trains and the Subway, changing (without extra fare) to trolley cars at Park Street Subway Station.

Passengers arriving by any of the steamship lines will land at some wharf along Atlantic avenue, and are advised to take a north bound elevated train via North Station and the Subway, transferring (without extra fare) at Park Street Subway Station to trolley cars passing through Copley Square.

Special messengers and guides will be in attendance on and after July 3 at all stations and wharves to direct and assist N. E. A. visitors.

MEMBERSHIP.

Active membership—The present active membership of the Association includes over 3,000 of the leading teachers in the United States.

All teachers and others actively associated with educational institutions, including libraries and periodicals, may become active members by paying an enrolment fee of $2, in addition to the annual dues ($2), which may be discharged by surrendering the railway membership coupon at the Registration Bureau.

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4. The privilege of voting, holding office, and sharing in the business management of the Association and its departments.

5. Many special privileges at the time of the annual convention which are extended to active members as the delegate and representative body of the Association.

Active members already enrolled are especially requested to announce the fact of such membership at the Registration Bureau at Boston, that the proper certificate and badge (blue) may be issued, and credit of dues paid entered on the records.

Associate membership.—Associate membership certificates will be issued to those who are not engaged in educational work, as well as to those who may be eligible to active membership, but who do not choose to enroll as such.

REVIEW.

The Executive Committee submits the foregoing bulletin of programs, railroad rates, and local arrangements for the Forty-second Annual Convention in confidence that it will convey assurance of a large and successful meeting at Boston in July.

While the chief concern has been to present the best possible programs for both general and department sessions, it has been the aim also to provide ample opportunities and facilities for visiting the many points of historical, literary, and educational interest in and about Boston. To this end all sessions of the Convention will be held in forenoons and evenings only, leaving the afternoons free for recreation and excursions.

These excursions will be under the direction of the Local Committee, who will provide valuable guide books and a sufficient number of expert conductors to insure the utmost profit as well as entertainment.

The generous plans of the American Institute of Instruction, supported by the state associations and other educational organizations of New England, for the social entertainment of the members at Rogers Hall promise to constitute a delightful and valuable feature of convention week.

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The provisions for the extension of tickets for return until September 1 will enable members to spend the vacation season in New England at any of the various mountain and seaside resorts, or in the quiet of New England homes. The railway lines leading from Boston are preparing complete guides to these resorts showing rates, routes, and cost of living at various points. These may be had on application to the Local Executive Committee, Room 701, No. 60 State street, Boston, Mass.

Attention is called to the excellent arrangement by which all meetings are to be held in the immediate vicinity of Copley Square. Admission to these meetings will be on membership badge or certificate. Special seats will be reserved for active members and their families until the hour of opening each session, when reserved seats not occupied will be thrown open to all members alike.

It should be noted that all states, without exception, are accommodated with headquarters rooms in hotels immediately about Copley Square, and that the Membership Registration Bureau, Joint Railway Agency, and Accommodations Committee, as well as the headquarters of the Executive Committee and department officers, are located on Copley Square at the center of all meeting places.

Active Members of the Association and others are invited to send to the Secretary, undersigned, addresses of those who will be interested to receive this Program-Bulletin, and to co-operate with their respective State Directors and Managers in extending information of the Forty-Second Annual Convention.

CHARLES W. ELIOT,
President N. E. A., Cambridge, Mass.

IRWIN SHEPARD,
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